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GEOPHYSICAL ABSTRACTS 112

JANUARY-MARCH 1943

COMPILED BY

W. AYVAZOGLOU

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September 1943.

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UINTED STATES DEPARTMENT OF THE INTERIOR-BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 112

JANUARY-MARCH 1943[1]

Compiled by W. Ayvazoglou[2]

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FOREWORD

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[2] Senior Translator, Bureau of Mines.

1. GRAVITATIONAL METHODS

6784. Barnes, V. E., and Romberg, Frederick. Gravity and Magnetic Observations on Iron Mountain Magnetite Deposit, Llano County, Tex. Geophysics, Menasha, Wis., vol. 8, No. 1, 1943, pp. 32-45.

An outcrop of magnetite in the Central Mineral region of Texas is explored experimentally with a dip needle and a gravity meter. Two anomalies are observed, one due to the outcropping body and one probably due to a previously unknown body close to the outcrop. The possible attitudes of the bodies are discussed, and their masses and probable dimensions are computed from the gravitational observations. - Author's abstract.

6785. Cumings, W. L., and Fraser, D. M. Gravimeter Survey from Chromite in Cuba (Abs.). Econ. Geol., Lancaster, Pa., vol. 38, No. 1, 1943, pp. 84-85.

In the early part of 1942 a gravimeter survey was carried out in the vicinity of Camaguey, Cuba. Stations were located on a 20-meter grid, and unusual care was exercised to obtain a high degree of accuracy in all observations and calculations. A number of gravity "highs" were located. By geological field work and by extensive drilling it has been possible to show that these highs are due to one, sometimes more, of the following relationships: (1) Dense serpentine in less dense serpentine; (2) gabbro masses in serpentine; (3) an area of shallow limonitic mantle surrounded by an area of deeper limonitic mantle; (4) an outcrop of compact serpentine or gabbroic rock surrounded by similar material but weathered; and (5) chromite in serpentine.

6786. Fenwick, W. H. Let's Take a Look at the Gravity Meter. Mines Mag., Denver, Colo., vol. 32, No. 10, 1942, pp. 504-509.

This article discusses the methods employed in making a gravity-meter survey for oil-exploration purposes, as practiced in the last few years. Advantages and disadvantages, pattern of work, accuracy control, final map interpretation, etc., are discussed, and the conclusion is drawn that gravity-meter prospects are bright, especially in the exploration of the vast unproved areas in the Rocky Mountains and plains regions, in foreign fields, and in the study of the small irregularities and distrubances noted in relation to the large anomalies found in the well-known oil provinces. - W. A.

787. Hammer, Sigmund. Note on the Variation from Equator to Pole of the Earth's Gravity. Geophysics, Menasha, Wis., vol. 8, No. 1, 1943, pp. 57 - 60.

The various physical factors constituting the increase in the normal acceleration of gravity of the earth from equator to pole are analyzed mathematically. The magnitudes of the essential factors are (1) centripetal acceleration + 3.39 gals, (2) decrease in distance from the center of the earth -- the so-called "free-air" effect + 6.63 gals, and (3) mass-shape effect due to polar flattening - 4.85 gals. - Author's abstract

788. Lambert, W. D. Notes on Earth Tides. Geophysics, Menasha, Wis., vol. 8, No. 1, 1943, pp. 51 - 56.

Attention is called to the problem of the zero point for earth tides; this involves the so-called permanent tide or increase in the flattening of the earth. A suggestion is made for the use of existing tabulations for computing theoretical earth tides. Attention is also called to the effect of the varying distance of the tide-producing body and to the secondary effects of the oceanic tides. Finally the author requests to be kept informed of current developments. = Author's abstract.

6789. Malkin, N. Conditions for Use of Stokes' Formula in Determining the Earth Figure from Observations on Gravity. Comptes rendus (Doklady) de l'Acad. Sci. de l'URSS., Moscow, vol. 35, No. 1, 1942, pp. 8-10.

The figure of the earth as derived from data on gravity by Stokes' formula is merely a first approximation. There remains a great deal of uncertainty both about the accuracy of this formula and the conditions under which it may be obtained. The author gives a mathematical discussion in which he attempts to complete the classic formula of Stokes to nearly such an extent as to give it a form in whcih its uncertaintics are eliminated as much as possible. - W.A.

6790. McCollum, E. V. Gravity Expression of the Hatchetigbee Anticline. Geophysics, Menasha, Wis., vol. 8, No. 1, pp. 46 - 50.

A reconnaissance gravity survey is presented of the Hatchetigbee area of southwestern Alabama, which discloses two gravity minima associated with the Hatchetigbee anticline and the neighboring Jackson fault. A study of the gravity data, together with geologic and magnetic information, leads to the possibility that a salt ridge exists in the general Hatchetigbee area and that the gravity minima represent individual salt domes. - Author's abstract.

6791. Swick, C.H. Pendulum Gravity Measurements and Isostatic Reductions. U.S. Deptartment of Commerce Coast and Geodetic Survey., Washington, D. C., Spec. Pub. 232, 1942, 82 pp.

This publication supersedes Special Publication 69, Modern Methods for Measuring the Intensity of Gravity, which was published in 1921 and which related principally to the Mendenhall-type pendulum appartus. In 1932 this appartus was largely superseded by the Brown gravity apparatus, designed and constructed by the late E.J. Brown, The principal consideration in designing the new apparatus was to speed observations without any loss of accuracy.

This manual includes a brief description of the Brown pendulum apparatus and of the corresponding methods and computations. Part of this manual is devoted to instructions for processing gravity results and making the isostatic reductions. The isostatic computations follow the general method outlined by John F. Hayford and William Bowie in Special Publication 10, but many changes have been made in the details of the methods. - W. A.

2. MAGNETIC METHODS

6792. Benedikt, E.T. A Method of Determining the Direction of the Magnetic Field of the Earth in Geological Epochs. Am. Jour. Sci., New Haven, Conn., vol. 241, No. 2, 1943, pp. 124-129.

Sediments of ferromagnetic particles, deposited in a magnetic field, are magnetically anisotropic. This has been established for artificially prepared sediments in a previous work of the author (see Jour. Appl. Physics, vol. 13, 1942, pp. 105-109) In the present work it is shown that a class of fine-grained sedimentary rocks (blue clay of the Boston Basin) exhibits the same type of anisotropy. This property can be expected to be general for rocks of the above type, and it can be used for the determination of the earth at the epoch of the sedimentation of the specimen. - Author's abstract.

6793. Broxon, J.W. Relation of the Cosmic Radiation to Geomagnetic and Helio-physical activities. Phys. Rev., Lancaster, Pa., vol 62, No. 11/12, 1942, pp. 508-522.

Relations between 28-day fluctuations of intensity of the cosmic radiation and both terrestrial magnetic activity and sunspot areas were investigated. Definite pulses, both in the magnetic character and in sunspot areas, were found to be associated with the primary pulses in the cosmic radiation at Boulder, obtained by Chree's "superposed-epoch" method. They were in general phase opposition to the cosmic-ray pulses, but the tip of the magnetic-character pulse preceded the tip of the opposite cosmic-ray pulse by one day; the lead was 3 or 4 days in the case of the opposed sunspot pulses. Similar relations were not found among secondary pulses, although a 34-day periodicity in sunspot-area pulses referred to days selected on the basis of cosmic-day intensity was displayed.

Direct application of Chree's method to the magnetic character and sunspot areas, individually, indicated a 27-day periodicity in the former and a 34-day periodicity in the latter. A second method of investigation, used by Graziadei, Kolhörster, and others, was also employed. This yielded results in some respects contradictory to the first. In particular, it indicated 27-day fluctuations in sunspot areas in phase with the cosmic-ray fluctuations and out of phase with changes in magnetic character. However, it also indicated the 34-day periodicity in sunspot areas for the period of the investigations was more pronounced than the 27-day periodicity. Among other possibilities, the possible effects of sunspots through the agency of their magnetic fields were considered. - Author's abstract.

6794. Hobson, G.D. Graphical and Mechanical Determination of the True Dip from Magnetically Orientatable Cores taken in Crooked Holes. Jour. Inst. Petroleum, London, vol. 28, No. 227, 1942, pp. 274-280.

A mechanical deviation corrector for finding the true dip and dip direction of the beds from magnetically orientatable cores cut in crooked holes has been described by Lynton in his article, Laboratory Orientation of Well Cores by their Magnetic Polarity (see Geophys. Abs. 91, No. 3962). However, some assumptions made by Lynton in connection with the work of the deviation corrector appear incorrect, although the error involved may be small provided that the deviation of the well from the vertical is not large. In the present article, Hobson gives a possible graphical solution of the question and also describes the modifications of the Lynton's deviation corrector by which the true dip and dip direction of the beds in magnetically oriented cores may be determined more accurately. A figure shows the essential features of the modification, and the method of using the deviation corrector is described.- W.A.

6795. Jenny, W.P. Micromagnetics. A New Quantitative Geophysical Method. Houston, Tex.. vol. 108, No. 10, 1943, pp. 21-24.

Fundamental principles of the micromagnetic method are briefly reviewed, and an entirely new approach for future micromagnetic exploration is visualized. The new procedure is explained by a theoretical example. - W.A.

6796. Jones, J. H. A Proposed Method of Measuring the Derivatives of the Earth's Magnetic Field. Geophysics, Menasha, Wis., vol. 8, No. 1, pp. 23-31.

The method of measuring the derivatives of the earth's magnetic field which is proposed depends on the fact that a small steady magnetic field will modify the e.m.f. induced in the secondary coil of a detector with a core of magnetizable material possessing high initial permeability and a high rate of increase of the permeability with the strength of the magnetizing field. It is shown that a detector of this type is equivalent to an inductor coil rotating with angular speed equal to the periodicity of the alternating magnetizing field. - Author's abstract.

6797. Nagata, Takesi. A Geomagnetic Study of the Minor Activities of Mihara Volcano, Osima Island, August 1940. Bull. Earthquake Res. Inst., Tokyo, vol. 19, No. 2, 1941, pp. 402-410.

The activity of Mihara Volcano was not accompanied by marked geomagnetic changes, probably because the present minor activity affected rocks up to only a slight area underneath the volcano. However, great disturbances in the geomagnetic field may be expected if severe activity occurs. Tables and graphs show the chemical composition of rocks and various magnetic properties of the ejecta. - W.A.

6798. Reich, H. The Magnetic Properties of Rocks and Ores and Problems of Ore Deposits Connected with Them. Ztschr. Deut. geol. Gesell., Berlin, vol. 93, 1941, pp. 443-455.

The magnetic properties of ferromagnetic rocks depend for the most part on their content of magnetite and pyrrhotite, not on their content of total iron. The results of boring are given in graphs and discussed. It appeared that in most rocks containing pyrrhotite, the remanent magnetism trangresses the inductive one, while in magnetitie-bearing rocks the reverse is true. The thermal conditions are of great importance for the magnetization. The magnetic minerals con be formed above or below the curie point. Metamorphic rocks may have their magnetic properties entirely altered by being heated. - T. Tryggvason, Chem. Abs., vol. 37, No. 4, 1943.

6799. Sen, Janshi. Calculation of the Depth of a Magnetic Deposit. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1535, 1943, 3pp.

This paper presents a method for calculating the maximum depth of a single-pole deposit and another for a two-pole mineral body by utilizing data of both vertical and horizontal intensities as obtained by a Thalen-Tiberg magnetometer. - W.A.

3. SEISMIC METHODS

6800. Birch, Francis. Elasticity of Igneous Rocks at High Temperatures and Pressures. Bull. Geol. Soc. America, Washington, D.C., vol. 54, No. 2, 1943, pp. 263-286.

In a continuation of earlier studies of the elasticity of rocks at high pressures, the rigidity and the velocity V_s of shear waves have been determined for a number of igneous rocks at temperatures up to 300° C, at pressures of 3,000 to 9,000 kg. per cm^2. The extreme experimental conditions approach closely the conditions of pressure and temperature to be found at the base of a 35-kilometer crust. The new measurements are presented briefly; a thorough discussion of their significance is deferred for a more complete future publication. - Author's abstract.

6801. Deacon, L. E. An Analysis of Abnormal Reflections. Geophysics, Menasha, Wis., vol. 8, No. 1, 1943, pp. 3-13.

During the course of a reflection survey of an area in southwest Texas, a group of seismograms was obtained on which were recorded a number of events having abnormal apparent velocities. The dips computed from these events on the assumption that they were conventional reflections in the plane of the profile were much larger than the anticipated stratigraphic dip. This paper presents a discussion of the possible origins of these events and an analysis which affords considerable evidence that they originated on fault planes. - Author's abstract.

The article is completed by discussions by Hewitt Dix and Curtis H. Johnson.

6802. Kanai, K., and Sezawa, K. On the Problem of Instabilities of Higher Orders in a Seismometer. Part 3: Experiments with a New Vertical Vibration Table. Bull. Earthquake Res. Inst., Tokyo, vol. 19, No. 2, 1941, pp. 177-185.

Experiments on the effect of vibration on the stability of a seismometer, discussed in a previous paper (Geophys. Abs. 107, No. 6286), were continued by using a new vertical-type vibration table recently constructed by the authors. The description of the new vibration table and of its operation is given. - W.A.

6803. Landsberg, H. Geophysics at Penn State, 1934-41. Mineral Industries, Pennsylvania State College, Pa., vol. 11, No. 20, 1941, pp. 1-3.

An account of the development of the program of research and teaching in geophysics at Pennsylvania State College, inaugurated in 1934 in the Mining Department. Using the definition of the subject set up by the American Geophysical Union of the Ntional Research Council, or briefly stated earth physics, certain phases were selected and work begun in earthquake seismology, a seismic station established, also work in meteorology, ground movements and mine subsidence. As additional staff became available, the courses and research program were expanded, attention being given to the exploration phases of the subject. Publications made, cooperative work with other agencies carried forward, and general growth of the program are described. - D.W. Mines Mag., vol. 33, No. 1, 1943.

6804. Sezawa, K., and Kanai, K. Transmission of Arbitrary Elastic Waves from a Spherical Source, Solved with Operational Calculus. I. Bull. Earthquake Res. Inst., Tokyo, vol. 19, No. 2, 1941, pp. 151-161.

The case of an arbitrary disturbance occuring abruptly is discussed. The solution consists of two parts, the free oscillation and the forced oscillation. The period and logarithmic decrement of the free oscillation depend on the size of the spherical origin and the elastic nature of the surrounding medium. - Author's abstract.

6805. Sezawa, K., and Kanai, K. On the Initial Movement of a Seismograph subjected to an Arbitrary Earthquake Motion, solved with Operational Calculus. Bull. Earthquake Res. Inst., Tokyo, vol. 19, No. 2, 1941, pp. 162-174.

The motion of the pendulum consists of two parts, a forced oscillation and a free oscillation. The initial motion of the pendulum is opposite in sense to that of the ground motion. In the case of a displacement seismometer the motion of the pendulum agrees with that of the ground, whereas in the acceleration seismometer it does not. When the disturbance occurs suddenly, the amount of initial displacement of the seismometer is the same as that of the ground motion, but in opposite sense. If the rapid ground motion begins with zero displacement and zero velocity, then, although the duration of the initial movement of the pendulum becomes very small, the amplitude is not abnormally large. - Author's abstract.

306. Seske, J.L. Computing Seismic Data by Simple Consistent Method. Mines Mag., Denver, Colo., vol. 32, No. 10, 1942, pp. 489-495.

The fundamentals and basic assumptions of reflection dip data are eviewed. Simplified and rigorous equations of calculation consistent with he velocity-depth functions and laws of wave propagation are given. The heory of computing charts for this method is outlined, and several chart types re developed. The errors and limitations of certain computation methods re discussed. - Author's abstract.

307. Swartz, C. A. Seismograph Evidence on the Depth of the Salt in Southern Mississippi Geophysics, Menasha, Wis., vol. 8, No. 1, 1943, pp. 1 - 2.

Reflection seismograph records shot over the tops of shallow salt domes n southern Mississippi show deep events which can reasonably be identified s reflections from the base of the salt. Calculations reveal the depth to the ottom of the salt mass to be approximately 22,000 to 26,000 feet. - Author's bstract

308. Torrey, P. D. Determining Fluid Levels. Internat Oil, Houston, Tex., vol. 2, No. 4, 1941, pp. 16-19.

A description of the application of the echo meter to determining the luid level in wells. It is brought out that in Kansas some 90 percent of all ells completed were tested for potential by draw methods in which the owering of the fluid level at a suitable rate of production is determined by a rocedure possible by development of suitable equipment such as the echometer or determining said levels. The equipment by which a pulse of energy from cartridge is introduced into the well and causes a wave to travel down the nnular space between casing and tubing is described, as well as the mechansm by which reflections of this air wave back to the surface as received on a icrophone are recorded. Examples of records are given and the equipment hown in pictures. Depths to fluid can be determined as wave travel can be reated as a constant. - D.W. Mines Mag., vol. 32, No. 10, 1942.

309. Yosiyama, R. Elastic Waves from a Point in an Isotropic Heterogeneous Sphere, III. Bull. Earthquake Res. Inst., Tokyo, vol. 19, No. 2, 1941, pp. 185-205. (For previous parts, see Geophys. Abs. 51 and 103, Nos. 365 and 5802).

Solution of the equation of motion of the elastic waves through a medium ith the properties referred to are discussed, using the results obtained in previous papers. Two waves are propagated through the medium, a longitudinal wave advancing with velocity $\sqrt{\frac{\lambda+2\mu}{\rho}}$, and the other, consisting of two types, A and B, both transverse, with velocity $\sqrt{\frac{\mu}{\rho}}$. Under certain conditions there are no transverse waves of type B. - G.E.A. Sci. Abs., vol. 45, No. 531, 1942.

4. ELECTRICAL METHODS

6810. Dawson, L. R. Amplified Curves Widen Value of Electric Logs. Oil Weekly, Houston, Tex., vol. 108, No. 13, 1943, pp. 26-28.

In numerous areas, particularly in the Wilcox trend, invasion of the sands by the drilling fluid has complicated the interpretation of electrical logs. A third curve may be employed, and its amplification may bring out features not distinguishable on the normal run. The procedure to be followed to obtain a better electrical log under extreme invasion conditions is as follows: (1) Run an electrical log every 7 to 10 days when drilling in the Wilcox sand; (2) run an overlap section each time a new run is made, and check the changes of the curves; (3) increase the saline content of the drilling fluid just before entering the Wilcox to reduce diffusion or ionization effects. - W. A.

6811. Doll, H. G. The S. P. Dipmeter. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1547, 1943, 10 pp.; see also Oil, New Orleans, La., vol. 2, No. 12, 1942, pp. 12-14.

This paper discusses a method and apparatus for determining the dip of formations traversed by a drill hole, by means of electrical measurements in the hole. The process consists in recording the spontaneous potentials present along three oriented generatrices in the hole. By comparison of the three curves thus obtained, after application of a correction factor to compensate for any deviations of the hole, the dip angle and the dip direction are determined. Excellent accuracy is obtained for dip angles over 10°.

Because the method is simple and the apparatus rugged, the measurements are rapid and reliable; consequently, they can be made at all the levels that are of interest at any time after the well has been drilled. Mechanical cores are not needed to evaluate the dips. A convenient time-saving procedure is to perform the dipmeter survey at the time the electrical log is taken, using for both operations the same cable and truck.

Actual examples of results obtained in wells of the Gulf Coast area are given. - Author's abstract.

6812. England, C. M. A Resistivity Survey of the Monument Oil Field. Geophysics, Menasha, Wis., vol. 8, No. 1, 1943, pp. 14-22.

This paper describes an electrical resistivity survey made in 1935 of an area in New Mexico now known as the Monument field. From the data obtained a map showing the structure at the base of the Red Beds was prepared which is in good agreement with structure disclosed by wells later drilled. - Author's abstract.

6813. Stern, Walter. Relation Between Spontaneous Polarization Curves and Depth, Size, and Dip of Ore Bodies. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1535, 1943, 8 pp.

The relations between the position (depth, size, and dip) of an ore body and the elements of a spontaneous polarization field produced by it are investigated with a view to evolving a method by which the first can be determined if the latter are known. A study of the influence of depth, size and dip of the ore body on strength and distribution of the spontaneous polarization on the earth's surface yields the following characteristic parameters: (1) The relative strength and (2) the respective distances between the potential maximum and minimum (negative and positive centers) and the position of the equipotential line 0. They are expressed by two ratios, the potential ratio and the distance ratio, from which the data required for defining the position of the ore body can be obtained. - Author's abstract.

6814. Uren, L. C. Electrical Logging to Determine Character of Formations. Petrol. Eng., Dallas, Tex., vol. 14, No. 3, 1942, pp. 46-56.

The author discusses fundamental principles involved in electrical logging, conditions that influence the results obtained, equipment employed, type of records, and their interpretation and application. A graph of a typical electrical log is given. Possibilities of further development of electrical logging are examined. Bibliography is added. - W. A.

6815. Winter, A. B., in collaboration with Bowsky, M. C., and Stick, J. C. Correlation Between Electrical Logs and Radioactivity Logs. California Oil World and Petrol. Ind., Los Angeles, Calif., vol. 35, No. 19, 1942, pp. 9-14.

The authors present several illustrations of comparison of the two types of logs made in the same well and point out some of the characteristic feature of radioactivity logging that should be considered when correlating with electr cal logs. The electrical log and the radioactivity log are measurements of entirely different response characteristics. The authors point out, however, tha if the typical characteristic response for various types of formations on the gamma-ray curve or neutron curve is understood, the gamma-ray curve or the combination of gamma-ray and neutron curves can readily be correlated with the electrical logs. - W. A.

5. RADIOACTIVE METHODS

6816. Ridland, G. C. Use of the Geiger-Müller Counter in the Search for Pitchblende-Bearing Veins at Great Bear Lake, Canada (Abs.). Econ. Geol., Lancaster, Pa., vol. 38, No. 1, 1943, pp. 88-89.

In conjunction with a geological investigation of the silver-bearing veins of Contact Lake, Northwest Territories, Canada, a survey was made with a Geiger-Müller counter of the gamma-ray emmissions from the rocks in the vicinity of the mine workings. Discontinuous pitchblende veins have been encountered occasionally in the silver-bearing fissures, and the geophysical survey was undertaken with the hope that abnormally high gamma-ray intensities, if detected, might lead to larger and more continuous pitchblende discoveries. Before the instrument was used at Contact Lake, preliminary tests were made, first, with laboratory specimens at Princeton University, and later over known pitchblende deposits at the Eldorado property, La Bine Point, N.W.T. The Geiger-Müller counter, as adopted for field use, is described; the technique of transporting and operating the instrument is outlined; and the general precautions to be observed are discussed. The results obtained at Great Bear Lake show that the instrument is capable of detecting not only a pitchblende ore shoot in a shear zone, but also the mildly radioactive "host rock" at a considerable distance from the ore body. Hence use of the Geiger-Müller counter is urged, not just for the detailed search for an ore body in a shear zone, but for the detection of possible radioactive "host rocks" in large-scale reconnaissance surveys of unexplored regions made by prospectors and members of Federal Geological Survey parties..

6817. Russell, W. L., and Downing, R. B. Neutron Logs Find Porous Zones in Western Kansas Limestones. Oil and Gas Jour., Tulsa, Okla., vol. 41, No. 13, 1942, p. 66.

In western and central Kansas, electric logs do not indicate the porous producing horizons of the limestones and dolomites with sufficient accuracy. Neutron well logging consists of subjecting the rocks around the well to a penetrating bombardment with artificially produced neutrons and measuring he effect by means of an ionization chamber some distance above the neutron ource. The response of the ionization chamber depends primarily on the mount of hydrogen-containing substances in the rocks - that is, on the amount f oil or water - and since these generally occupy pores, the response is often measure of the rock porosity. However, chemically combined water in limetone or shale will also affect the ionization, thus giving misleading indications egarding porosity. Neutron logs can be made in cased holes. If neutron logs re used in conjunction with radioactivity logs, it is possible to pick out shale orizons which give misleading porosity indications. While neutron logs at resent do not show the nature of the fluid content of the pores, they do yield ata about the depths, thicknesses, and continuity of the various porous rocks, which may be helpful in deciding whether oil, gas, or water is likely to be present.

The neutron and radioactivity logs of two wells are appended, and their ndications are discussed. - G. D. H. Jour. Inst. Petrol., vol. 28, No. 226, 1942.

6818. Stothart, R. A. Radioactivity Determinations Set Production Delimitations. Oil Weekly, Houston, Tex., vol. 108, No. 5, 1943, pp. 19-21.

A series of experiments on various types of formations that either lie lose to or actually form oil-bearing strata carried out to show the presence of radium are described; the author concludes that in view of the present adaptability of the radioactive method of prospecting and the results obtained it may be considered that proper application of known methods of measuring radioactivity where production is established will reduce, if not eliminate, the drilling of dry holes heretofore necessary to establish the limits of commercial production. - W. A.

7. GEOCHEMICAL METHODS

6819. Sawdon, W. A. Mud-Analysis Logging in California Fields. Petrol. Eng., Dallas, Tex., vol. 13, No. 10, 1942, p. 48.

The equipment is housed in a trailer. Briefly, it consists of a depth meter that indicates the total depth of the hole and the location of the bit in relation to bottom; a pump-cycle counter and a meter showing the rate at which the pump is operating in cycles per minute; a gas detector; and an ultraviolet-light apparatus for oil detection. A sclerograph, operating in connection with the depth-meter, records the drilling rate, instrumental gas readings, pump-cycle count readings, and power applied to the rotary table. Also included in the trailer is complete core-analysis equipment for determination of permeability, porosity, and residual fluids of any cores that may be taken. Electrical equipment employed is operated by 110-volt, 60-cycle alternating current, and when direct current is being used on the rig it is converted to alternating current by a motor-generator set mounted in the trailer.

During drilling the bit drills up and disintegrates a circular core of the formation, and the gas, oil, and salt water contained in the pore spaces of this core are picked up by the drilling fluid. By analyzing continuously the fluid on its return to the surface and correlating for depth, the gas, oil, or salt content of the formation at the point drilled can be determined. Due to the salinity of the mud fluid generally used in California, accurate determinations of salt-water content of the formation are difficult to make, and it has been the practice in California to confine the logging to gas and oil determinations. Logging and typical logs are described and analyzed. Detection of oil and gas in the mud is particularly studied. It appears from results obtained that mud-analysis logging provides reliable qualitative data on oil and gas saturation of formations drilled. As with other subsurface information, the results should be evaluated in connection with all other data obtained. - A.H.N. Jour. Inst. Petrol., vol. 28, No. 225, 1942.

8. UNCLASSIFIED METHODS

6820. Gabriel, V.G. The Geophysicist and the Geologist. Internat. Oil, Houston, Tex., vol. 2, No. 4, 1941, pp. 56-57.

A discussion of the problem of cooperation between geologist and geophysicist, or vice versa. It is recognized that the problem has many angles as witnessed by the divergence of published views of many competent men, which are considered by the writer. The specialized nature of geophysics is pointed out and the necessity of the geological knowledge of more than passing amount by geophysicists is noted, as well as the need for geologists attached to geophysical work having a knowledge of geophysics and its background for the most successful and result-producing cooperation. - D.W. Mines Mag., vol. 33, No. 1, 1943.

6821. Hagiwara Takahiro. Observation of Changes in the Inclination of the Earth's Surface at Mount Tukuba, Part 2. Bull. Earthquake Res. Inst., Tokyo, vol. 19, No. 2, 1941, pp. 218-225.

In his previous paper (Geophys. Abs. 98, No. [illegible]01) the author described the changes in inclination of the earth's surface observed at Mount Tukuba during the period from 1935 to 1937. This paper describes the changes in inclination for the period from December 1937 to October 1940. The changes are shown by graphs. Meteorological elements, such as air pressure, air temperature, and precipitation, which may be related in some way to these changes are also plotted in the figures. A table of fairly severe earthquakes that occured near Mount Tukuba during 1938, 1939 and 1940 is added. - W.A.

6822. Heiland, C.A. Geophysics. Min. and Met. New York, vol. 24, No. 434, 1943, pp. 73-76.

One year of war has affected all geophysical activity. "Geophysics as sual" is definitely out for the duration. Hence, the technical information rdinarily given in these annual reports is less than usual. Moreover, many evelopments in geophysics and allied detection fields are of military value nd can be described only in a most general way.

Technical developments, oil-field activity, search for strategic minerals, eophysical education, and geophysicists' aid in war work are described. A reat obstacle to accelerated geophysical exploration is the shortage of man-ower, as many field men are in military service. The practice of drafting ssential men of the geophysical industry is not consistent with the demand for n increase in petroleum exploration. - W.A.

823. Jakosky, J.J., Dreyer, R.M., and Wilson, C. H. Geophysical Investigations in Tri-State Zinc and Lead Mining District. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 21, No. 1, 1943, pp. 86-87.

The feasibility of using geophysical methods as a guide to ore prospect-ng in the Tri-State zinc-lead mining district of Kansas, Oklahoma, and Miss-uri is examined. The following types of geophysical surveys were conducted: Electrical resistivity, geothermal, geochemical, gravity, natural earth poten-ial, and magnetic. Results obtained in this investigation indicate that the geo-hemical, geothermal, and natural earth potential are negative as regards their iagnostic value in the delineation or location of ore bodies in that area. It was ndicated that the magnetic work was useful as a guide in interpreting regional ravity anomalies. Regional gravity investigations are recommended. The use f resistivity measurements has been found to be possible in mapping certain structural and lithologic features associated with ore mineralization.

Copies of the final bulletin describing these investigations, which is now n press may be obtained from the Director, Engineering Experiment Station, University of Kansas, Lawrence, Kans. - W.A.

824. Nettleton, L.L. Recent Experimental and Geophysical Evidence of Mechanics of Salt-Dome Formation. Bull. Am. Assoc. Petrol. Geol. Tulsa, Okla., vol. 27, No. 1, 1943, pp. 51-63.

In 1934 the writer presented a theory of salt-dome formation (Geophys. Abs. 67, No. 2135) and illustrated it with a model which indicated: (1) That he motive force causing salt uplift in simple domes is essentially the gravi-ational force resulting from the fact that the density of the salt is less than hat of the surrounding sediments, and (2) that both salt and sediments behave essentially as highly viscous fluids. The present paper considers the experi-mental and theoretical work, largely by others, carried out since that time, which has a bearing on this fluid-mechanical theory.

In 1937 Hubbert considered fundamental dimensional criteria which should be applied to scale models and derived the numerical relations between the physical constants of a model and its prototype in nature which should be fulfilled to give true dynamic similarity. Dobrin in 1941 determined physical constants of a fluid salt-dome model, applied Hubbert's analysis, and established the fact that the model fulfilled the dimensional criteria. By measurement of flow rates and viscosities in a model, he determined the equivalent viscosity for the sediments and arrived at a value which is in reasonable accord with determinations by other means. The experiments by Griggs and the thermodynamic development of physics of stressed solids by Goranson in recent years have interpreted the physical properties of rock material in terms of long-time stresses. This work has clarified and evaluated certain fundamental properties such as "strength", "plasticity", etc., that are directly applicable to the fluid-mechanical postulate of salt-dome formation. Finally, recent extensive geophysical work and drilling around salt domes have revealed the existence, in many places, of rim synclines which are a natural consequence of the fluid-mechanical theory and which were relatively unknown or unrecognized as such at the time of the earlier paper. All of this work seems to confirm the general hypothesis that salt-dome formation is largely a fluid-mechanical process.

Some further model experiments by the writer have been made in an attempt to simulate dome formation where the salt flow is modified by strong layers in the sediments penetrated by the dome. The salt forms thus indicated are shown to be qualitatively similar to reasonable deductions from geophysical and drilling data over a particular dome which probably formed under such circumstances. - Author's abstract.

6825. Nickell, F A. Development and Use of Engineering Geology. Bull. Am. Assoc. Petrol. Geol. Tulsa, Okla., vol. 26, No. 12, 1942, pp. 1797-1826.

The engineer is forced to consider early in the study of new projects what effect natural conditions will have on costs and ultimate success of construction. Gradually, he has realized in geology a way to anticipate and understand these conditions. Appreciation was not instantaneous, for it has required at least 30 years to arrive at the present status. The engineering geologist is primarily concerned with the occurrence and physical character of rocks, ordinarily at relatively shallow depths. His work in obtaining necessary information revolves more around questions of feasibility and security than matters of economic justification. The investigation and construction of Boulder, Grand Coulee, Shasta, Friant and Marshall Ford Dams present a wide variety of problems. These are, according to volume, the five largest concrete dams in the world. - Author's abstract.

With regard to the carrying on of geophysical surveys the author says:

By virtue of analogy between theory and physical constants of rocks, methods of geophysical surveys promise more than a means to determine structure and sequence of formations. The electrical-resistivity equipment and the refraction seismograph are finding increasing use both for preliminary and supplemental engineering investigations. It is unlikely, however, that any geophysical device will entirely displace operations wherein actual samples can be recovered. The seismograph has considerable appeal along research lines in stability analyses of foundations and buildings. It can be adapted with refinements for measuring deterioration of concrete by relationship of seismic velocities to modulus of elasticity. Operating costs of a small seismograph party are approximately $50. per day. - W.A.

826. Oil and Gas Journal, Tulsa, Okla. (Editorial). Typical Oil-Field Structures: Salt Dome; Esperson and Barbers Hill, Coastal Texas, Vol. 41, No. 13, 1942, p. 42.

Salt domes occur in the coastal plain from the Mississippi to Jackson County, Tex. The formations of the plain outcrop in bands roughly parallel to the coast and range from the Lower Cretaceous to the Pleistocene. Some beds change from continental to marine toward the coast. Although there are many sands, unconsolidated clays form the bulk of the section. The regional dip is gently coastward, with some reversals which may be due to deep-seated salt domes. In addition, there are piercement and nonpiercement salt domes. The salt may be steep-sided or overhanging. The anhydrite caps are believed to be residual, and a Jurassic age is assumed for the salt.

Oil may occur in supracap sands, in the cap rock, or in flank sands, the age of the producing beds ranging from Pliocene to Wilcox. The producing sands are often lenticular, and the oil in the supracap and flanking sands may be indigenous to the pay horizons. Salt domes occur also in the interior of Texas and Louisiana, and in Germany and Rumania. The early salt domes were found by surface features, but later the torsion balance and refraction seismograph were the chief means of discovery. Now the latter have been superseded by the gravimeter and the reflection seismograph. - G.D.H. Jour. Inst. Petrol., vol. 28, No. 226, 1942.

6827. Oil and Gas Journal, Tulsa, Okla. (Editorial). Progress in Exploration, Vol. 41, No. 34, 1942, pp. 172-181.

The progress made during recent years in closer collaboration between geological and geophysical departments has tended to overcome the lack of development of new methods. Of the three methods of prospecting - electrical, magnetic, and geochemical - the revival of the first two is evident. The reflection seismograph and gravimeter remain far in front of all other geophysical methods. Many methods have been devised for measuring the dip of cores, but a new one now under development at present measures the dip of formations penetrated by means of electric logging. The method is described briefly and illustrated by a diagram. - W.A.

6828. Petroleum Engineer, Dallas, Tex. (Editorial). Science Beats Guesswor
in Finding Oil. Vol. 13, No. 11, 1942, p. 56.

Geology, geophysics, geochemistry, or some combination of these scientific methods was used to locate 2399 of the wildcats drilled in 1941, and 471 of the wells found oil. Only 30 of the 801 wildcats located nontechnically were successful. The reason for drilling 64 wells, 2 of which were successful is unknown. Normally about one-tenth of all wells drilled each year are wildcats or wells sunk in the hope of finding new fields. This year, because of the shortage of steel, the total wells will probably number only half that for 1941. G.D.H. Jour. Inst. Petrol., vol. 28, No. 223, 1942.

6829. Riecken, Hugo. Ingenuity and Oil. Mines Mag., Denver, Colo., vol. 32,
No. 10, 1942, pp. 532-535 and 550.

The ingenuity and inventive ability of petroleum engineers are presented Electrical logging, gun perforating, survey methods, pressure core barrel, acidizing, open-hole caliper, and pumping are the examples taken at random and discussed in this article. - W.A.

6830. South African Mining and Engineering Journal (Editorial). Geophysical
Prospecting, Fifty Years Progress Reviewed. Vol. 52, No. 2547,
Johannesburg, 1941, pp. 323-329.

An account of the development of geophysical prospecting is given, illustrated by photographs of current South African field practice. The article summarizes the successful results of geophysical work in the extension of the gold-producing area of the Rand, based largely on very extensive magnetic surveys, one being reported in 1935 involving 35,000 stations and some 435 miles of traverse. The torsion balance, through a survey in which some 20,000 stations were set, is credited with the discovery of new potential gold fields. The latter is of interest in geophysical history, as the torsion balance has not been considered primarily as a mining exploration instrument.

Government interest since 1935 has resulted in geophysical investigations with the seismic method in relation to the problem of rock bursts, also exploratory magnetic surveys and gravity work. Engineering applications in water location and other problems are also recognized, according to the article as the contributions of this art to the war effort. Electrical surveys are also mentioned as having played a part in exploration which, with other methods, precede test-drill locations. The name of O. Weiss appears often in the article as tribute to his personally very important part in geophysics in South Africa in all its phases. - D. W. Mines Mag., vol. 33, No. 1, 1943.

5831. Tsuya, H., Takhasi, R., Hagiwara, T., Minakami, T., Nagata, T., Omote, S., and Hirano, K. The Eruption of Miyake-sima, One of the Seven Izu Islands, in 1940. Bull. Earthquake Res. Inst., Tokyo, vol. 19, No. 2, 1941, pp. 260-401.

The eruption of Miyake-sima began July 12, 1940 and lasted over three weeks. Observations on various phases of the activity of this volcano were made by the scientists mentioned above. These observations have been described by the members of the party as follows:

1. Geological Observations of the Miyake-sima Eruption of 1940, by H. Tsuya
2. The Temperature of Lava, by T. Nagata.
3. Viscosity of the Akabakkyo Lava, by T. Hagiwara.
4. The Magnetic Properties of the New Ejecta, by T. Nagata.
5. The Earthquakes That Accompanied the Eruption, by T. Hagiwara.
6. Pulsations of the Ground That Accompanied the Volcanic Activity, by T. Minakami.
7. Anomalous Change in Geomagnetism Accompanying the Volcanic Activity, by T. Nagata
8. A Magnetic Dip Survey of Miyake-sima, by T. Minakami.
9. Time Variations in Magnetic Dip, and Their Topographical Distribution in Miyake-sima, by T. Minakami.
10. Changes in Earth Potential After the Eruption, by T. Hagiwara.
11. Changes in the Vertical Intensity of Geomagnetism That Accompanied the Eruption, by R. Takahasi and K. Hirano.
12. A Topographic Survey of the New Parasitic Cones and the New Lava Flow of Miyake-sima, by S. Omote.

13. Horizontal and Vertical Ground Displacements Associated with the Eruption, by S. Omote.

14. A Graph for Comparing Changes in the Amplitude of Daily Pulsations, the Number of Daily Earthquakes, the Earth Potential, and the Magnetic Dip, by T. Hagiwara, T. Minakami, and T. Nagata.

The articles are illustrated by maps, diagrams, tables, and photographs. -W.A.

9. NEW PUBLICATIONS

6832. National Oil Scouts and Landmen's Association. Oil and Gas Field Development in United States, Year Book 1942. Vol. 12, 790 pp. Box 425, Austin, Tex. Price, $7.50.

The book gives an annual review for 1941 of geological and geophysical prospecting, land and leasing activities, wildcat exploration, proved field development, oil and gas production, and pipe-line and refinery statistics -W.A.

6833. National Research Council, Transactions of the American Geophysical Union, 23rd Annual Meeting, April 3 and 4, 1942, Part 2 Washington, D.C., pp. 173-740.

Part 2 contains the following reports and papers:

Section of Geodesy: Investigation of the Effect of Heavy Construction on Nearby Bench Marks, by H.S. Rappleye; Use of Accounting Machines for Mass Transformation from Geographic to Military-Grid Coordinates, by F.L. Culley; Computation of Geographic Positions by the Calculating Machine, by L.G. Simmons; Use of the Prismatic Astrolabe for Astronomic Positions by the Hydrographic Office, by L.M. Samuels; Gravity Observations in Peru and Colombia, by O.I Aslakson; Recent Progress in Geodetic Surveys of the United States Coast and Geodetic Survey, by H.W. Hemple; Report on the Primary Triangulation Along the North Shore of the Gulf of St. Lawrence, 1941, by N.J. Ogilvie; Progress of Geodetic Work in Mexico, by M. Medina; and Cartography and the War Effort: Aviation Versus Navigation, by R.M Field.

Section of Seismology: Seismic Prospecting in New England, by D. Linehan; A Statistical Study of the Periods and Amplitudes of Microseisms, by J.T. Wilson; Progress Report on Seismological Activities of the United States Coast and Geodetic Survey, April 1, 1941, to March 31, 1942, by Frank Neumann; On the Determination of Elastic Constants Within the Earth from Seismometric Data, by Archie Blane.

Section of Meteorology: The Structure of the Wind Over a Sand Dune, by H. Landsberg; Nocturnal Wind Velocity, Eddy Stability, and Eddy Diffusivity Above a Citrus Orchard, by R.A. Kepner, L.M.K. Boelter, and F.A. Brooks; Note on the Variation of Wind with Height in the Layer near the ground, by C.W. Thornthwaite and Maurice Halstead; The Measurement of Wind and Moisture Gradients over a reservoir, by J.C. Owen and M.H. Halstead; Meteorological Problems of the Americas, by R.H. Weightman; Computation of Maximum Possible Precipitation, by A.K. Showalter and S.B. Solot; On the Observation and Measurement of the Apparent Shift in Direction of the Radio Beam of an Air Beacon and Certain Relations to Meteorological Conditions, by H.T. Stetson and D.S. Mackiernan, Jr.; The Interdiurnal Variability of Temperature on Mount Washington, by V. Conrad; and The Sunspot Period and Spring Rainfall in the United States, by H.H. Clayton.

Section of Terrestrial Magnetism and Electricity: Earth's Magnetic Field and Actual Heights in the Ionosphere, by H.W. Wells; Geomagnetic Survey of a Portion of Southeastern New York, by R.A. Geyer; Goemagnetic Bays, Their Frequency and Current Systems, by H.B. Silsbee and E.H. Vestine; The Annual Variation of Geomagnetism, by E.H. Vestine; Recent Alterations in Geomagnetic Secular Variation in Eastern North America, by H.H. Howe; Methods Used in the Production of the 1940 Isogonic Chart of the United States, by D.G. Knapp; Atmospheric-Electric Observations at the Needham Laboratory for Cosmic Terrestrial Research, by H.T. Stetson; On the Anomalous Diurnal Variation of Air Conductivity and Potential Gradient at the Huancayo Magnetic Observatory, by M.W. Jones and P.G. Ledig: Atmospheric Electric Results from Simultaneous Observations over the Ocean and at Watheroo, Western Australia, by G.R. Wait; Overcoming the Humidity Problem at a Tropical Magnetic Observatory, by John Hershberger; Magnetic Work of the United States Coast and Geodetic Survey from April 1941 through March 1942, by O.W. Swainson; Researches in Terrestrial Magnetism and Electrictiy at Department of Terrestrial Magnetism, Carnegie Institution of Washington, for the Year April 1941 to March 1942, by J A Fleming.

Section of Oceanography: The Oceanographic Work of the Hydrographic Office During the Past Year, by G.S. Bryan; Oceanographic Work of the United States Coast Guard in the Western North Atlantic in 1941, by R.R. Waesche; Oceanographic Activities of the United States Coast and Geodetic Survey, by L.O. Colbert; Research Within Physical Oceanography and Submarine Geology at the Scripps Institution of Oceanography during April 1941 to April 1942 by H.U. Sverdrup and staff; Related Problems in Shore Processes and Oceanography, by M.A. Mason; United States Navy Contribution to the Oceanography of the Caribbean Sea, with Special Reference to the Thresholds Between Basins, by R.H. Whitcroft; Some Observations on the Peruvian Coastal Current, by M.J. Lobell; Pacific Campaign of the Schooner Askoy-Darien, Colombia, Ecuador, by R.C. Murphy.

Section of Volcanology: A Syntectonic Intrusion in Eastern Alabama, by H.R. Gault; Origin of the Ayer Granodiorite in the Lowell Area, Massachusetts, by R H. Jahns; Intrusive Rocks in the Blue Ridge Plateau, Virginia, by A.J. Stose; Origin of the Chelmsford Granite, Massachusetts, by L.W. Currier; Structural Observations Indicating an Intrusive Origin for the Beartooth Batholith, by E.C.H Lammers; The Pelham Gneiss Dome, Massachusetts, by Robert Balk; Basement Volcanology, by Augustus Locke; Origin and Structural Relationships of the Igneous Member of the Livingston Formation, Montana, by W.H. Parsons and M H. Stow; The relations of the Anorthosite and Gabbro in the Lake Sanford Area, New York, by R.C. Stephenson; A Course of Concentration of Iron, Titanium, and Phosphorus in Magmatic Differentiation, by A.F. Buddington; The Nabesna Gold Deposit, Alaska, by R.G. Wayland; The Field of Stability of Pyrrhotite, by Einar Jensen; Formation of Aegirine-Augite and Arfvedsonite by reaction, by R.R. Coats.

Pages 349 to 593 contain reports and 29 papers relating to the Section of Hydrology.

Section of Tectonophysics: The Importance of the Ross Shelf Ice to Structural Geology, by W.H. Bucher; Structures in the Canadian Shield, by A.W. Jolliffe; Fabric Analyses of Rock Flowage, By Ernst Cloos; The Major Deformational Patterns Characteristic of the Earth's Crust and Their Mechanics of Origin, by W.T. Thom, Jr.

Pages 711 to 740 contain minutes of general assemblies and sections, as well as indexes of names and subjects.

Copies of Transactions may be purchased by nonmembers of the Union, as follows: Orders, with check payable to the American Geophysical Union, should be addressed to the General Secretary, American Geophysical Union, 5241 Broad Branch Road, N.W , Washington, D.C. Price of Part 2, $4.50.

6834. Seismological Society of America, Eastern Section. Earthquake Notes (A.K. Ludy, editor). Washington, D.C., vol. 14, No. 1/2, 1942, 10 pp.

This issue contains the following notes: (1) Announcement by the Retiring Chairman, Ralph R Bodle; (2) Announcement by the Chairman, Elwin L. Perry; (3) Treasurer's Report; (4) Dr. Edmond Rothe (information of his death); (5) Rev. Emmanuel Navarro Neumann, S.J.; (6) Do Deep-Focus Earthquakes Have Aftershocks?, by R.R. Heinrich; (7) Dams Built on Faults; (8) Golden Gate Bridge; (9) Luminous Phenomenon Accompanying the Cyprus Earthquake, January 20, 1941; (10) South American Earthquakes; (11) Earthquakes Registered in Switzerland; (12) New Zealand Earthquakes Reported in Nature; (13) Vibrations in Structures (abs. by H.M. Engle of his article in Engineering News-Record for May 21, 1942); (14) Notes of Interest; and (15) Officers of the Eastern Section, Seismological Society of America. - W.A.

10. PATENTS

6835. Selector System for Amplifiers; C.A. Heiland, assignor to Heiland Research Corporation. U. S. Patent 2,285,170, issued June 9, 1942.

In a geophysical prospecting system that includes means for measuring and recording the amplitude of waves after their passage through the earth being surveyed and including a circuit for transmitting electrical impulses from a detector to a recorder; means for preventing operation of the recording device by insignificant waves that reach the pick-up device at definite intervals during the arrival of the significant waves, said means comprising a second circuit connected with the transmitting circuit and arranged to attenuate signals transmitted by the said transmitting circuit to an amplitude insufficient to operate the recorder when the said second circuit is energized, a time-controlled mechanism for energizing the said second circuit at intervals in predetermined sequence, and means for setting the said time-controlled mechanism in operation in synchronism with the arrival of waves at the detector - Claims allowed, 9.

6836. Vibration Pick-Up; P. J. Costa and G. E. Holback, Yonkers, N. Y. U.S. Patent 2,286,897, issued June 16, 1942.

A vibration pick-up comprising a tubular member, heads for closing the ends of the member, a rod disposed through the tubular member and engaged with the heads to hold the heads in place, a permanent magnet within the tubular member free for reciprocation created by vibration, said permanent magnet being also freely mounted on the rod connecting the heads to hold the magnet against side play, a pair of coils surrounding the tubular member and connected in series and in opposition, said coils being spaced apart along the tubular member, yieldable means for normally holding the magnet, when the magnet and coils are in quiescence, with its center substantially midway of the coils and output conductors leading from the coils for the electrical impulses induced by the relative reciprocations of the magnet and the coils. - Claims allowed, 5.

6837. Apparatus for Obtaining Soil Samples; R.N. Platts, Jackson County, Mo., F. B. Slichter, Johnson County Kans., E. L. O'Donnell. Jackson County. Mo., and P. T. Bennett, Johnson County, Kans. U.S. Patent 2,287,059, issued June 23, 1942.

In a power-operated drilling machine, the combination with a prime mover, including a pressure cylinder, a reciprocatory piston within the cylinder, means for supplying pressure to the upper and lower faces of the cylinder, means for connecting the piston with an interchangeable drilling implement and coupling means carried by the prime mover; a ground-anchored assembly including a base, a coupling collar on the base, interacting means between the coupling collar and coupling means carried by the prime mover for effecting a rigid but quick detachable engagement between the prime mover and ground anchored assembly, and means for clamping the base on and firmly securing it to the ground, said means including a plurality of anchoring rods and coacting means on the upper ends of the rods and said base. - Claims allowed, 16.

6838. Vibration Pick-Up Device; E.W. Pike, Swarthmore, Pa., and A.W. Vance, Haddonfield, N.J., assignors to the Radio Corporation of America, a corporation of Delaware. U.S. Patent 2,288,838, issued July 7, 1942.

A device of the character described comprising a vibration pick-up element, including a series resonant circuit having a frequency-determining element adapted to be displaced by an object whose position is to be indicated, means including a pair of conductors and a remote current source for applying an alternating current of constant frequency to said circuit, the frequency of said current being equal to the normal resonant frequency of said circuit, and means responsive to changes in the power factor of said alternating current for indicating the displacement of said element. - Claims allowed. 7.

6839. Vibration Indicator; Charles W. Gadd, Detroit, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware. U.S. Patent 2,293, 288, issued August 18, 1942.

A vibration responsive device comprising a housing, a mass mounted for oscillation about an axis in said housing and counterweight means resiliently connected to said mass and said housing for oscillation relative to said mass and said housing to maintain said mass in a constant mean position which is at all times fixed with respect to the housing regardless of the direction in which the force of gravity acts on the mass, the resilient connections comprising spring means tending to hold the counterweight means in a fixed position relatively to the housing, and spring means tending to hold the mass in a fixed position relatively to the counterweight means. - Claims allowed, 3.

6840. Force-Measuring Device; Lucien J.B. La Coste and Arnold Romberg, Austin, Tex. U.S. Patent 2,293,437, issued August 18, 1942.

A gravity-measuring device comprising the combination of a support, an elongated weight member adapted to respond to the force to be measured, and a plurality of approximately purely tension-spring means floatingly suspending said member from said support to pivot about a point in response o the force of gravity, said spring means being disposed so that their effect cts in the path of movement of said weight member and the weight member s yieldable in any direction under impact, said spring means including at least ne spring of substantially zero length, and means for restoring the member to ormal position for effecting a null reading. - Claims allowed, 26.

841. Force-Measuring Device; Hart Brown and John H. Martin, Houston, Tex. U.S. Patent 2,295,026, issued September 8, 1942.

A force-measuring device comprising a support, a trifilar suspension omprising three rotatable members mounted on the support symmetrically bout a point thereon, a suspension strand carried axially of each of said members, and a force-responsive member supported by said strands, certain f said strands being twisted whereby the force-responsive member is rotated to a position of equilibrium by the torque. - Claims allowed, 7.

842. Method and Means for Determining the Points of Ingress of Well Fluids; John R. Gillbergh, Palo Alto, Calif. U.S. Patent 2,295,738, issued September 15, 1942.

A method of determining the points of ingress of formation fluids in a borehole, including the steps of: Loading said borehole with fluid to overbalance formation pressure sufficiently to prevent flow of formation fluids thereinto; drawing off fluid from the borehole to initiate flow of formation fluids thereinto; and determining fluid character at each of a plurality of predetermined spaced stationary points in the borehole repeatedly at relatively short time intervals in a test period to produce a plurality of series f sufficiently closely successive readings over coextensive time periods to produce contemporaneous histories of significant changes in fluid character ccurring at said predetermined points during the test period. - Claims allowed, 20.

6843. Electrically Fired Borehole Gun; R.R. Thompson, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,296,318, issued September 22, 1942.

A perforating gun for boreholes, comprising a gun body, bullets mounted for radial discharge from said gun body, a powder chamber arranged behind each bullet, a firing filament in each of said outer chambers, and a firing circuit including a source of power, a conductor connecting said source of power to each of said filaments, a resistance arranged in parallel with each of said filaments, there being a separate resistance for each filament, and a conductor independent of said filaments for connecting each of said resistances separately and individually to the ground. - Claims allowed, 6.

6844. Gravity Balance; L.W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,296,330, issued September 22, 1942.

In a gravity balance, a horizontally disposed bar, a beam having arms protruding horizontally from an intermediate portion of the beam, filaments connected to the arms from opposite ends of the bar to suspend the beam at the right angles to the bar, a weight supported directly by one end of the beam, a second weight, means suspending the second weight from the opposite end of the beam, a bracket extending vertically from an intermediate portion of the beam and having a laterally extending portion, a filament extending from the portion to one of the arms, and a horizontal pendulum in the form of a mirror carried by the filament. - Claims allowed, 10.

6845. Borehole Tool; W.D. Mounce, Houston, Tex., assignor to Standard Oil Development Co., a Corporation of Delaware. U.S. Patent 2,296,366, issued September 22, 1942.

A borehole tool comprising, in combination, a body, dogs pivoted to said body arranged to be outwardly extended from and to be collapsed toward said body, an actuating means arranged on said body to extend said dogs when in a first position and to allow said dogs to collapse when in other positions, and locking means arranged to release said actuating means to said first position when adjacent a magnetically permeable body, and to lock it away from said first position when not adjacent a magnetically permeable body. - Claims allowed, 6.

6846. Astatic Electromagnetic Vibration Detector; Alexander Wolf and Lawrence G. Cowles, Houston, Tex., assignors, by mesne assignments, to The Texas Co., New York, N.Y., a corporation of Delaware. U.S. Patent 2,293,754, issued September 22, 1942.

An electromagnetic earth-vibration system comprising two similar detector units, each of said units including a magnet having an outer pole and an inner pole, a pick-up coil wound around the inner pole of each magnet, and an annular inertia member resiliently suspended between the poles of each magnet, each of said coils having the same number of turns and the magnetic field being of equal magnitude and of the same direction in the two coils, said detector units being arranged in a parallel relation in a vertical plane and eparated in the direction in which direct waves are received by a distance uch that voltages induced in the coils by the direct waves will be opposite in hase, the polarity of the inner pole of the magnet of one unit being the opposite o the polarity of the inner pole of the magnet of the other unit, the pick-up oils of said unit being connected electrically in series so that the resulting utput of said pick-up coils due to earth vibrations is equal to the algebraic um of the voltages of each of said coils, while the voltages induced in said oils by an external magnetic field are canceled. - Claims allowed, 1.

847. Earth Exploration; W.L. Horner, Dallas, Tex., assignor to Core Laboratories, Inc., Dallas, Tex., a corporation of Delaware. U.S. Patent 2,296,852, issued September 29, 1942.

In the art of oil-well drilling, the method of determining probable roduction characteristics of substrata sand that is sufficiently permeable for roduction purposes and that contains gas under pressure, comprising anayzing core samples taken from the sand for the space occupied by gas, and tilizing the results of such analyses as indexes for indicating whether the and will produce gas, water, or oil, or a mixture thereof. - Claims allowed, 6.

848. Method and Apparatus for Determining the Point of Water Entry Into Oil Wells; M.E. Chun, Huntington Park, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U.S. Patent 2,296,931, issued September 29, 1942.

A method of determining the point of water entry into a well bore haracterized by: Positioning a testing element in the well bore, which lement extends throughout the region to be tested; leaving the testing element n place for a period calculated to permit detectable chemical action on said esting element; removing said testing element; and examining said testing lement for variations in chemical action thereon. - Claims allowed, 8.

5849. Directional Drift Recorder; Philip Jones, Los Angeles, Calif. U.S. Patent 2,296,996, issued September 29, 1942.

In a well-surveying device: A tubular housing; a perforated, lightsensitive record disk transversely disposed in said housing; means for projecting light rays through the perforation in said disk, and direction-responsive means including a concave mirror for projecting the rays so projected upon said record disk so as to produce a record of the orientation of said disk. - Claims allowed, 10.

6850. Seismic Circuits; J.O. Parr, Jr., San Antonio, Tex. assignor to Olive S. Petty, San Antonio, Tex. U.S. Patent 2,297,319, issued September 29, 1942.

An amplifier system for use in seismic surveying, including in combination, cascaded thermionic amplifier tubes having control elements, an automatic volume-control tube having a control element, means feeding a portion of the amplifier output to the control element of said A.V.C. tube, and means to apply a predetermined portion of the output of the A.V.C. tube to the control element of one of said amplifier tubes to regulate the gain thereof, said means also applying said portion to the control element of said A.V.C. tube. - Claims allowed, 19.

6851. Spontaneous Potential by Induction; Eugen G. Leonardon, Houston, Tex., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U.S. Patent 2,297,538, issued September 29, 1942.

The method of locating porous earth formations traversed by a borehole, which comprises the steps of obtaining indications of the magnetic field produced in the borehole by spontaneous currents flowing in the vicinity of the boundary between adjacent formations of different porosity. - Claims allowed, 19.

6852. Method of Locating Strata in Wells and Electrode Apparatus Therefor; G.H. Ennis, Long Beach, Calif., assignor of one-half to R.V. Funk, Long Beach, Calif. U.S. Patent 2,297,754, issued October 6, 1942.

A method of determining the location of strata in a well, which method includes the steps of: Forming an electric circuit including an electrode movable in said well; moving said electrode in said well; maintaining said electrode in definite oriented position in said well; and measuring changes in electrical values which occur when said electrode is moved in said well. - Claims allowed, 15.

6853. Coupling; William R. Flatford, Bartlesville, Okla. assignor to Phillips Petroleum Co., a corporation of Delaware. U.S. Patent 2,297,328, issued October 6, 1942.

In a coupling for well-logging apparatus, the combination comprising a body member; a multiple conductor cable extending through the body member said cable having a weight-supporting conductor; and a weight-supporting member attached to the weight-supporting conductor and electrically insulated om the body member, said weight-supporting member being compressively aded and transmitting the weight associated with said coupling to the ight-supporting conductor of said cable. - Claims allowed, 2.

54. Method of Detecting the Penetration of an Oil-Bearing Horizon; J.B. Campbell, Houston, Tex., assignor to R.H. Fash, trustee, Fort Worth, Tex. U.S. Patent 2,297,939, issued October 6, 1942.

The method of exploring for oil, which consists in obtaining a sample the drilling fluid entering a well and another sample of approximately e same drilling fluid leaving the well, evaporating separately portions of th samples to dryness to obtain in each case a substantially dry solid sidue, extracting the oil from the solid residues, respectively, by means of solvent, comparing the fluorescence of each extract thus obtained under traviolet light with standard solutions wherein the oil concentration is own, said comparison being based on the premise that the oil concentration an extract will approximate the oil concetration of a particular standard lution having substantially the same fluorescence, expressing the results as rts per million of oil of the respective solid residues, comparing the data us obtained and noting any material increase in the oil content of the solid sidue of the drilling fluid leaving the well in contrast to the oil content of e solid residue of the fluid entering the well, to thereby detect the peneation of an oil-bearing horizon. - Claims allowed, 3.

55. Seismic Surveying; J.O. Parr, Jr., San Antonio, Tex., assignor to O.S. Petty, San Antonio, Tex. U.S. Patent 2,298,020, issued October 6, 1942.

A seismometer of the electromechanical transducer type for use in ophysical prospecting to pick up seismic waves in the band extending from to 70 cycles per second originating from a distant shot, and in which the nsitivity is dependent upon and varies with the closeness of spacing of the nerating elements, in combination, a casing carrying one of said elements, steady mass carrying the second of said elements, means suspending said ass from said casing and providing a restoring force therefor, said means d mass being adjusted to provide a period for the mass of the order of that er which the shot generating seismic wave train exists from any one single hot. - Claims allowed, 8.

356. Well Logging; L.G. Howell, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,298,794, issued October 13, 1942.

A method for logging boreholes which comprises passing along the orehole a plurality of Geiger-Müller counters, amplifying the output pulses of said counters continuously, combining said amplified pulses in a single conductor in out-of-phase relationship, conducting said pulses to the surface, separating said pulses at the surface, and separately recording values, each of which is a function of one of said pulses. - Claims allowed, 3.

6857. Submarine Detector; V.S. Goloviznin, New York, N.Y., assignor of one-half to G.A. Rubissow, New York, N.Y.; Eugenia Goloviznin, administratrix of said V.S. Goloviznin, deceased, assignor of one-half to Walte Goloviznin, Sea Cliff, Long Island, N.Y.: U.S. Patent 2,300,565, issued November 3, 1942.

An apparatus for detecting the approach of vessels, consisting in at least two bodies submerged under water at a predetermined depth and provide with a material capable of conducting electricity; each of said bodies being maintained at the said predetermined depth by attaching means; each of said attaching means being attached by one of their ends to the said bodies and by their other ends in a predetermined fixed relationship to the ground underneat the water, the horizontal component of the buoyancy exercising on each of sai bodies a predetermined pressure, said horizontal component being sufficient to provide said pressure between the said bodies; means to permit at least on of said bodies to move freely but limited substantially in the horizontal plane while maintaining the same buoyancy; a contact surface being provided betwee the said materials while pressed one against the other; at least one insulating wire being attached by its one end to each of the said materials; means to provide and maintain an electric current in the said wires and the said materials; means attached to the other end of the said wires for registering t variations of the said electric current; said variations caused by sound waves or like pulses; and means by which said variations are converted into signals. Claims allowed, 7.

6858. Electrical Prospecting Method; G.A. Smith, Philadelphia, Pa., assigno Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U.S. Patent 2,300,709, issued November 3, 1942.

The method of determining porosity characteristics of strata traversed by a borehole comprising moving through the borehole an electrode, causing a flow of current through strata surrounding the electrode by applying to the electrode, through a resistance of a substantially higher order than any resistances appearing at the electrode during its passage through the strata, substantially constant potential of the same order of magnitude as the electro osmotic flow potentials due to the porosity of the adjacent strata, and observi the changes of intensity of the electrode current as a measure of the porosity characteristics while the electrode traverses the strata. - Claims allowed, 2.

859. Process for Obtaining Temperature Gradients in Bore Holes; C.E. Reistle, Jr., Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,301,326, issued November 10, 1942.

A method of obtaining the temperature gradient in a well, comprising e steps of arranging within the well a conduit of substantially less cross- ectional area than the bore of the well provided with means for preventing e flow of well fluid therein, allowing fluid to be produced by said well rough the space between said conduit and the wall of the well, and making a eries of temperature measurements along spaced points in said conduit hile the well is producing. - Claims allowed, 1.

860. Gravity Meter; Anton Graf, Berlin-Steglitz, Germany, vested in the Alien Property Custodian. U.S. Patent 2,301,396, issued November 10, 1942.

A gravity meter comprising, in combination, a mass mounted for dis- lacement in vertical direction, springs means balancing the gravity force f said mass, an optic-electric cell system adapted to transform light variations nto electric values, indicating means operatively connected to said cell ystem, to indicate said values, a first diaphragm having apertures for per- itting the passage of light so as to fall on said cell system, said first iaphragm being arranged to be displaced with said mass, a second diaphragm aving apertures for permitting the passage of light, said second diaphragm eing fixedly mounted so that upon displacement of said first diaphragm with eference to said second daphragm the quantity of light reaching said cell ystem will be changed, the apertures of said first and said second diaphragm eing elongated and extending transverse to the direction of the displacement of aid mass, the elongated apertures of one of said diaphragms being longer than e apertures of the other so as to avoid a change in the quantity of light reach- ng said cell system by any lateral displacement of said first diaphragm with eference to said systems due to an inclination of the gravity meter against e vertical line. - Claims allowed, 4.

861. Seismic Well Logging; Henry Salvatori, Los Angeles, Calif., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,301,458, issued November 10, 1942.

In an apparatus for seismic differential well logging including a self- nergized generator of intermittent bursts of seismic energy in a well and two eceivers of seismic waves positioned substantially equidistantly above and elow said generator, the improvement which consists of a multiconductor cable y means of which the output of each of the two receivers is separately conducted to the surface of the ground, a first thyratron tube the grid of which is coupled to the output of one of said detectors, a second thyratron tube the grid of which is couplet to the output of the other of said detectors, means for connecting the outputs of said thyratron tubes to a ballistic recording galvanometer in opposition, and a deenergizing circuit including two thyratron tubes, the grids of each of which are coupled to the outputs of both of said detectors, said deenergizing circuit being so constructed and arranged that current flows in the plate circuits of said first-mentioned two thyratron tubes and said galvanometer only during the time interval between the arrival of each burst of seismic energy at said two receivers. - Claims allowed, 3.

6832. Gain Control for Seismograph Amplifiers; J.P. Milton and E.M. Shook, Dallas, Tex., assignors, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N.Y., a corporation of New York. U. S. Patent 2,301,739, issued November 10, 1942.

In an apparatus for seismic prospecting that comprises means for generating a series of seismic waves, means for detecting said waves at a distant point, means for amplifying said detected waves and means for recording said amplified waves, the improvement that comprises means for changing the degree of amplification during the reception of a series of waves in accordance with a preset time schedule, entirely independently of control by the amplitude of the waves, said preset time schedule being comprised of thre definite periods, the first of which consists of a preset period of time at the beginning of the schedule, during which period of time the degree of amplification is constant and relatively high, the second of which consists of a preset period of time, immediately following the first, and during which time the degree of amplification is reduced from the relatively high degree of the first period to a relatively low degree, and the third of which consists of a preset period of time, immediately following the second, and during which the degree of amplification is increased from the relatively low degree to a relatively hig degree, said means for changing the degree of amplification including means for separately manually adjusting each of the three preset time periods. - Claims allowed, 1.

6833. Well Surveying Instrument; G.A. Smith, Philadelphia, Pa., assignor to Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U.S. Patent 2,301,757, issued November 10, 1942.

A well-surveying instrument comprising means for supporting a record member, electrically operating means for recording position of the instrumen on said record member, means providing a holder having a pair of electrical contact portions in the circuit of said electrically operated means, and a devic rranged to be removably assembled with said holder to bridge electrically, nd to close said circuit between, said contact portions, said device comprising eans for interrupting its electrical continuity between said contact portions fter a predetermined time interval to open permanently the circuit of said ectrically operated means. - Claims allowed, 5.

364. Infinite Period Seismometer; G.W. Hostetler, San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U.S. Patent 2,302,219 issued November 17, 1942.

An astatic seismometer system comprising, in combination, a recording eans, a case, a steady mass, means supporting the mass from the case and roviding restoring forces therefor proportional to displacements thereof elative to the case, an electric circuit for associating the seismometer with aid recording means and having a steady average current flowing therein when e mass and case are relatively stationary, devices associated with the case nd mass so constructed and arranged as to control the flow of said current in ccordance with relative displacement of the mass and case, said recording eans being adapted to record the instantaneous value of current in said circuit, nd means responsive to said current adapted to neutralize the said restoring rces for all relative positions of the mass and case. - Claims allowed, 11.

365. Well-Surveying Method and Apparatus; Jacob Neufeld, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla , a corporation of Delaware. U.S. Patent 2,302,247, issued November 17, 1942.

In a device for geophysical prospecting which includes a source of rimary radioactive radiations and a detector for detecting radiations that esult in the bombardment of formations under investigation with said primary adiations, the improvement that comprises as a source of said primary adioactive radiations a material that emits said primary radioactive radiaons upon being bombarded with less-penetrating radiations, a source of said ess-penetrating radiations and means to shield said source of less-penetrating adiations so that said less-penetrating radiation bombards said source of rimary radiation substantially only in a predetermined direction. - Claims llowed, 7.

366. Seismic Wave Amplifier; Herbert Hoover, Jr., Sierra Madre, Calif., assignor to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U.S. Patent 2,303,357, issued December 1, 1942.

In an amplifier utilizing automatic amplitude control having an input and an output, gain-control elements within said amplifier intermediate said input and output, means responsive to output signals for deriving corresponding amplitude control voltages, means for applying a part of said amplitude-control voltages to one of said gain-control elements having a negative curvatu characteristic in which said negative curvature increases with control voltage over a substantial control voltage range, and means for applying a part of said amplitude-control voltage to one of said gain-control elements having a positiv curvature characteristic, both parts of said control voltages tending to simultaneously affect the gain in the same direction, whereby stable automatic amplitude control action is attained over a wide range of incoming signal strength. - Claims allowed, 11.

6867. Stable Seismic Wave Amplifier with Automatic Volume Control; Herbert Hoover, Jr., Sierra Madre, Calif., assignor to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U.S. Patent 2,303,358, issued December 1, 1942.

In an amplifier having an input, an output, and a gain-control element, filtering means intermediate the gain-control element and the output, an automatic volume-control circuit connected between the output and the gain-control element, the constants of the automatic volume control circuit being such that the gain of the amplifier may be varied at a frequency comparable to the frequency of waves readily transmitted through said filter, and means for varying the gain of said automatic volume-control circuit inversely as a functi of the amplifier gain. - Claims allowed, 3.

6868. Seismometer; H. W. Washburn, Pasadena, Calif., assignor to Consolidat Engineering Corporation, Pasadena, Calif., a corporation of California. U.S. Patent 2,303,413, issued December 1, 1942.

In an electromechanical transducer having a magnetic system and a magnetic armature cooperating with said magnetic system to produce first magnetic forces acting on the armature and tending to restore the armature to a neutral position when displaced therefrom in a predetermined direction, a pick-up coil surrounding said armature and responsive to flux changes through the armature, resilient means supporting said armature on said magnetic system also tending to restore said armature to said position after displacement therefrom in said direction, and additional magnetic means cooperating with said armature and said magnetic system and positioned to provide a second magnetic force to at least partly counteract said restoring forces. - Claims allowed, 9.

369. Well-Surveying Method and Apparatus; R.E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U.S. Patent 2,303,688, issued December 1, 1942.

A method of geophysical prospecting that comprises continuously
xposing successive regions of a formation about which information is desired
bombardment with neutrons, each region being exposed for a sufficient
eriod of time to establish secondary gamma-ray radiations from any
uminum present, simultaneously and also continuously measuring the
tensity of gamma rays radiated from successive regions of said formation
at will a definite time thereafter be exposed to neutron bombardment,
multaneously and also continuously measuring the intensity of gamma-ray
diation from successive areas of said formation that already have at a
efinite time previously been exposed to neutron bombardment and combining
aid measurements to obtain an indication of the aluminum content of the
rmation. - Claims allowed, 13.

370. Subsurface Prospecting; A.J.F. Siegert, Houston, Tex., assignor to Texaco Development Corporation, New York, N.Y., a corporation of Delaware. U.S. Patent 2,303,709, issued December 1, 1942.

In the process of investigating the formations surrounding a borehole
which highly penetrating particles such as neutrons are caused to enter
e formation and to be scattered therein, certain of the neutrons being
eturned to a detector disposed near the source of the particles, the method
f increasing the number and energy of the neutrons caused to enter the
rmation which comprises surrounding the source of neutrons with a sub-
tance in which nuclear fission may take place so that said substance will be
ombarded by the neutrons from said source to cause nuclear fissions
ith attendant liberation of neutrons, whereby the neutrons leaving the
urrounding substance will have a higher energy and will be greater in
umber than those leaving the source. - Claims allowed, 9.

371. Means for Testing Underground Strata for the Fluid Content Thereof; L.A. Douglas, San Antonio, Tex. U.S. Patent 2,303,727, issued December 1, 1942.

A testing tube for oil wells, comprising a vacuum chamber having a
acuum performed therein, a barrel adapted to receive an explosive charge,
n element adapted to be impelled along said barrel by the action of said
xplosive charge, means for firing the explosive charge from the surface of
he ground, a tubular core tool carried by said element adapaed to penetrate
he strata to be tested under the action of the explosive charge, means for

maintaining connection between the vacuum chamber and the core tool throughout the travel of the core tube, so that the liquid and gaseous pore content of the strata may flow through said tool to the vacuum chamber and means rupturable by the entry of the core tool into the strata to be tested whic holds the vacuum until the seal is ruptured, and an apron having an outwardly flaring inner wall said apron extending around the core tool and serving to impact mud around the rear portion of the core tool into the strata to be tested, which holds the vacuum until the seal is ruptured. - Claims allowed, 1

6872. Apparatus for the Measurement of Gravity; Shelley Krasnow, New York N.Y. U.S. Patent 2,303,845, issued December 1, 1942.

In an apparatus for the measurement of gravity, a frame, a torsion fiber, and a weight member, the weight member being made of a material which is an electrical insulator and which has a low coefficient of expansion, the said member being coated with an electrical conducting film so as to allow the conduction of an electical potential thereto, means connecting the said member to a source of electrical potential, a conducting plate, and means for applying a potential difference between the said weight member and said conducting plate so as to cause an electrostatic force therebetween. - Claims allowed, 6.

6873. Means for Analyzing and Determining the Characteristics of the Geolog Strata; R.F. Beers, Dallas, Tex. U.S. Patent 2,304,051, issued Decemb 1, 1942.

A system for determining the characteristics of geologic strata traversed by a borehole comprising means having an external metallic conductor for generating sound waves at one point in the borehole, means also having an external metallic conductor for receiving said sound waves at another point in said borehole means providing an electrode externally of said borehole and circuit means including electrical conductors for said soun transmission and receiving means having bridge elements connected across said conductors at both ends thereof with center tap connections from said bridge elements to said external metallic conductors in said borehole and said external electrode, and means connected in said phantom circuit for measuring currents and the potentials traversed over said circuits. - Claims allowed, 4.

6874. Gravity Meter; L.M. Mott-Smith, Houston, Tex., assignor to V.J. Meye U.S. Patent 2,304,191, issued December 8, 1942.

In combination, a gravity meter having a part movable according to variation in gravity, a single means for projecting a pair of light beams, means carried by said movable part for varying one of said light beams without disturbing the other as said part is moved, separate means for receiving said light beams, respectively, and means for balancing said receiving means each other to eliminate the effect of variation in light source and to determine the variation due to movement of said part. - Claims allowed, 6.

6875. Gravity Meter; P.S. Williams, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,304,324, issued December 8, 1942.

In a gravity meter having a pivoted beam carrying a weight responsive to gravity changes, in combination, a flat coil carried by a free end of said beam and arranged in the plane of movement of said beam, a pair of pole pieces mounted on either side of said coil with their faces parallel with the plane of said coil, a source of current connected to said coil, and means for indicating the amount of current supplied to said coil. - Claims allowed, 3.

6876. Mass Clamp for Gravity Meters; H.A. Maeder, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N.Y., a corporation of New York. U.S. Patent 2,304,737, issued December 8, 1942.

In a clamp, a pair of spaced clamping members, each having a surface for engaging the article to be clamped, means for moving each of said members toward the other including a system for exerting equal hydraulic pressure on said members, individual spring means associated with each member in opposition to said hydraulic pressure, said individual spring means being of unequal strength, whereby one of said members will move prior to the other, means for limiting the total movement of said prior moving member, and means yieldably projecting from said engaging surfaces of the clamping members for engaging the article to be clamped. - Claims allowed 3.

6877. Seismograph; M.D. McCarty, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N.Y., a corporation of New York. U.S. Patent 2,304,738, issued December 8, 1942.

An electrical seismograph detecting unit comprising in combination a case, top and bottom independent detecting units vertically disposed within said case, means for mounting said units in said case for oscillation in vertical places, each detecting unit having a horizontally disposed coil, means forming a rotary contactor for making an electrical connection between the bottom detecting unit and the conductors that are adapted to conduct the electrical signals, which have been generated by the bottom unit, to a point outside the case whereby said units can be rotated relative to each other to place their coils in hum-bucking relationship. - Claims allowed, 1.

6878. Method for Recording Seismic Waves; J.P. Minton, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co. Inc., New York, N.Y., a corporation of New York. U.S. Patent 2,304,740, issued December 8, 1942.

A method of recording reflected seismic waves that comprises the steps of detecting the seismic waves by generating corresponding electrical signals, amplifying a portion of the generated signals directly, taking a selected order of derivatives of at least one other portion of the generated signals, adding the derivatives singly or in combination to the amplified first portion such that the resultant signals will be at least in part in phase with the portion of the directly amplified signals, and recording the sum on a single trace. - Claims allowed, 1.

6879. Electrical Prospecting; J.P. Milton, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N.Y., a corporation of New York. U.S. Patent 2,304,739, issued December 8, 1942.

In a method of geophysical prospecting in which electrical current pulses are introduced into the earth's surface and caused to flow between spaced electrodes, the improvement which comprises varying the rate of application of the current to the earth's surface until the rate which gives the penetration desired is found, causing the current pulses to flow between the electrodes, detecting the current thus caused to flow through the earth's surface between a second pair of spaced electrodes as a function of time and recording parameters of the current pulses from which anomalies in the subsurface strata can be located. - Claims allowed, 5.

6880. Gravity Meter; D.H. Clewell, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York. U.S. Patent 2,304,748, issued December 8, 1942.

A gravity meter comprising a support, a bar mass, means pivotally connecting said mass to the support for ratation in a plane that makes an acute angle to the horizonal, said means extending outwardly from the upport in such a manner that the center of gravity of the mass is above the ivot point, a filament having its upper end rotatably secured to the support at point substantially on the pivotal axis of rotation of the mass and its bottom nd secured to the free end of the mass, and means for rotating the upper end f the filament to set up torsional stresses in it to rotate and elevate the mass adjust its sensitivity. - Claims allowed, 4.

881. Geochemical Prospecting; C.R. Hocott, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U.S. Patent 2,305,082, issued December 15, 1942.

A method for surface prospecting for subterranean petroleum deposits hich comprises collecting oil-free samples of surface soil at spaced points ver an area to be explored, refluxing each sample with a solvent capable f dissolving waxlike bodies from the soil, said solvent being incapable of uorescing under ultraviolet light, subjecting each extract so obtained to the ction of ultraviolet light and comparing the relative fluorescence of the arious samples. - Claims allowed, 4.

882. Geophysical Exploration System; Herbert Hoover, J., Sierra Madre, C.G. Morgan and N J. Christie, Pasadena, Calif., assignors to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U.S. Patent 2,305,383, issued December 15, 1942.

Apparatus for seismic surveying, comprising a series of spaced preads of receiving stations, each station within each spread being spaced from other stations in said each spread, the entire series of spreads delineating a line of exploration, means for generating seismic waves positioned etween end receiving stations of adjacent spreads, said end receiving stations f adjacent spreads being linked by an additional spread being outside of the ine delineated by said prior recited generating and receiving stations, and eans for recording the wave disturbances received by the receiving stations n each spread. - Claims allowed, 19.

883. Geophysical Prospecting Method; Herbert Hoover, Jr., Sierra Madre, Calif., assignor to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U.S. Patent 2,305,384, issued December 15, 1942.

The method of prospecting for a subterranean mineral deposit, which omprises drilling boreholes into the earth at systematically distributed ampling positions throughout an area to be prospected, measuring the alues of a characteristic of earth material in place at different depths in the walls of each of the boreholes, locating a line of demarcation between the weathered layer and the subweathered layer at each of said positions by determining from said values the depth at which an abrupt change in said characteristic occurs along the length of each of the boreholes, obtaining earth samples from the subweathered layer at each of said positions by collecting an earth sample from each of the boreholes at a depth greater than the depth where said change occurs, and analysing said samples for the presence of minute concentrations of constituents associated with remote underlying mineral deposit. - Claims allowed, 3.

6884. Expander for Electrical Seismographs; M.D. McCarty, Dallas, Tes., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N.Y., a corporation of New York, U.S. Patent 2,305,543, issued December 15, 1942.

In a seismograph circuit having means for detecting seismic waves by generating electrical signals corresponding to the seismic waves, said signals being of a plurality of definite frequencies, thermionic tube amplifying means for amplifying the electrical signals of all of the frequencies, and means for recording the electrical signals in coordination with time, the improvement which comprises means for diverting a portion of the signals passing through the amplifier, a filter for suppressing the signals of undesirable frequencies from the diverted portion of the signals, means for rectifying the signal voltages of the selected frequency, and means for applying the rectified voltages to the control grid of at least one of the thermionic amplifier tubes to control the gain in amplification imparted to all signals passing through that tube independent of their frequencies. - Claims allowed, 1.

6885. Geophysical-Prospecting Apparatus; Hans Lundberg, Ltd. assignee of Hans T.F. Lundberg, both of Toronto, Ontario, Canada, assignee of Theodor Zuschlag, West Englewood, N.J. U.S.A.: Canadian Patent 407,129, issued September 1, 1942.

This invention relates to an apparatus for detailed analysis of electrical ground transients comprising, a source of direct electric current flow, means for intermittently reversing said flow, pick-up means, an indicating device which is normally nonconductive, periodically operating timing means for rendering said device conductive for short and preselected time periods during the current flow, means to balance said indicating device, and means for reading the time and amplitude constants of the measured ground transients. - Claims allowed, 9.

386. Oil-Bearing Horizon Penetration Detecting Method; Ralph H. Fash, trustee, Fort Worth, assignee of John G. Campbell, Houston, both in Texas, U.S.A. Canadian Patent 407,890, issued October 6, 1942.

This invention relates to the method of determining the penetration of an oil-bearing horizon in the drilling of a well, which consists in obtaining a sample of the drilling fluid entering a well and an independent sample of approximately the same drilling fluid leaving said well, subjecting the said in side-by-side relation to the action of ultraviolet light in order to cause the oil content thereof to fluoresce, the intensity of the fluorescence of said fluids being in direct proportion to the oil content thereof, and visually noting any increase in the fluorescence of the oil-charged drilling fluid as compared to that entering the well to thereby detect the penetration of an oil-bearing horizon. - Claims allowed, 7.

387. Petroleum Prospecting Method; Standard Oil Development Co., Linden, N.J. assignee of Millard S. Taggart, Jr., Houston, Tex., both in the U.S.A. Canadian Patent 410,020, issued January 12, 1943.

This invention relates to a method for surface prospecting for subterranean petroleum deposits which comprises determining the oxidation-reduction characteristic of surface soil at spaced points over an area to be surveyed. - Claims allowed, 3.

388. Geochemical Prospecting Method; Standard Oil Development Co. Linden, N.J. assignee of Leo Horvitz, Houston, Tex., both in the U.S.A. Canadian Patent 410,021, issued January 12, 1943.

This invention relates to the method of geochemical prospecting for deposits the leakage components of which are of a reducing nature comprising collecting earth samples at spaced points in a region to be explored, and analyzing such samples for those ions of polyvalent elements present in lower states of valence. - Claims allowed, 14.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

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GEOPHYSICAL ABSTRACTS 113

APRIL-JUNE 1943

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

I.C. 7257,
September 1943.

INFORMATION CIRCULAR

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 113, APRIL - JUNE 1943 [1]

Compiled by W. Ayvazoglou [2] and V. Skitsky [3]

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[2] Principal translator, Bureau of Mines.

[3] Senior translator, Bureau of Mines.

1. GRAVITATIONAL METHODS

6889. Aslakson, C. I., and Swick, C. H. **Gravity Observations** in Peru and Colombia. Coast and Geodetic Survey, Special Pub. 233, U. S. Government Printing Office, Washington, D. C., 1943, 18 pp. (Price, 10 cents.)

In accordance with the policy of cooperation among American republics, the United States Coast and Geodetic Survey in 1941 made gravity surveys in Peru and Colombia. The information was desirable for determining the figure of the earth for geophysical purposes and for studying the relationship between intensities of gravity and deflections of the vertical. The survey instrument was the Brown pendulum apparatus. 11 gravity stations were established in Peru and 13 in Colombia. The results obtained at these stations are given in a table covering observed gravity, theoretical gravity, and anamalies. - V. S.

6890. Betz, F., Jr., and Hess, H. H. The Floor of the North Pacific Ocean. Geograph. Rev., New York, vol. 32, no. 1, 1942, pp. 99-116.

A discussion of bathymetric contours and new chart of the North Pacific. Correlation of certain gravity profiles and ocean deeps is given. Conclusion indicates pronounced intersecting linear trends of great length on the floor of the Pacific Basin which outline the Hawaiian swell. These trends may, it is suggested, represent zones of transcurrent faulting, and the Hawaiian swell may represent a thick lens of volcanic ejectamenta related to such a fault zone. - D. W., Mines Mag., vol. 33, no. 2, 1943.

6891. Gelfand, I. C. The Direct and Reversed Problems of the Potential of Gravity for a Homogeneous Spherical Segment (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Ser. Geophys., Moscow, no. 1, 1941, pp. 89-94.

The writer determines the potential of a homogeneous spherical segment by using the polynomial equations of Legendre. He then assumes that subterranean geological deposits have the shape of horizontally disposed spherical segments. As a result, a method of treating gravitational observations is devised, which is based on application of the previous calculations to the values of the gravity gradient and to the differences of terrestrial curvatures in the region explored. - V. S.

6892. Khmelevskaya, L. V. Occurrence of Oil as Related to Gravitational Anomalies. Comptes rendus (Doklady) de l'Academie des Sciences de l'U.R.S.S., Moscow, vol. 36, no. 6, 1942, pp. 182-184.

The view prevails that no definite relationship exists etween the distribution of gravitational anomalies and the ccurrence of oil deposits. The writer considers that this iew is based on a purely formal morphological approach. She tudies the effects that the processes in the interior of the arth exert through the ages on the development of its surface. his approach leads her to the following conclusions:

(1) The oil-bearing strata in primary deposits are of a ore ancient origin than the orogenic phase which originated he oil,

(2) The oil found in the vicinity of young orogenic regions s situated in zones of negative anomalies; here oil deposits re associated with young rocks not older than the gas-forming hase in the region concerned,

(3) The oil found in the vicinity of ancient orogenic egions is situated in zones of positive anomalies; this oil was rimarily deposited in more ancient rocks than the orogenic phase esponsible for structures in the respective region,

(4) The sign of anomalies can be changed by more recent ovements creating new dislocations in the border portions of he ancient orogenic regions now forming parts of plateaus. - . S.

893. Longwell, C. R. Geologic Interpretation of Gravity Anomalies in the Southern New England - Hudson Valley Region. Bull. Geol. Soc. America, vol. 54, no. 4, 1943, pp. 555-590.

Pendulum stations occupied by the United States Coast and eodetic Survey at locations chosen for the geologic significance rovide a net in southern New England, eastern New York and orthern New Jersey comprising about 120 stations. Numerous upplemental stations have been added with a modern gravimeter. pecific gravities of representative rocks near the pendulum tations have been determined.

Isanomaly maps based on isostatic, Bouguer, and free-air nomalies are remarkably alike in their major features. Some roups of anomalies reflect bedrock units that have exceptional ensities. When corrections are applied for these local masses, egional tendencies are clarified. Two belts of negative anomaies are separated by a belt of positive anomalies. The negative elts correspond in a general way to axes of subsidence during aleozoic periods. The entire region experienced orogenic eformation, followed by peneplanation.

Since the groups of Bouguer anomalies are little affected by he ordinary isostatic corrections, and are related only in minor degree to the visible bedrock, it appears that they either indicate considerable departures from isostatic balance or reflect differences in density that are concealed. Glennie's hypothesis of crustal warping, in a modified form, offers an attractive explanation of the outstanding anomalies. - Author's abstract.

2. MAGNETIC METHODS

6894. Brandl, W. Erdmagnetische Untersuchungen im Brockenmassiv (Magnetic Survey of the Brocken Massif). Preuss. Geol. Landesanstalt, Abh., N. F., no. 188, 1939, 82 pp.

A comparison between the results of a detailed magnetic and geologic survey of the Brocken massif (Harz Mountains region of Germany). The author interprets the magnetic picture of the region in terms of geologic and mineralogic characteristics. A microscopic study of the rocks as an aid in the interpretation is also included.

The rocks comprising the area vary considerably in mineralogy. They include both igneous and sedimentary types. The former vary in composition from a norite series and a gabbro series to a normal granite. A good correlation exists between changes in mineralogical composition and magnetic characteristics of the area. A combined geologic and magnetic map on the scale of 1 : 50, 000 is included.

The data used in compiling the magnetic portion of the map consist of 4,757 different magnetic stations. The station spacing for detailed traverses is between 80 - 150 meters, and for regional traverses about 1 kilometer. Scale values used ranged from 29.9 - 38.3 gammas. A total variation in ΔZ of more than 2,000 gammas was measured. - R.A.G., Ann. Bibl. Econ. Geol., 1941, vol. 14, no. 2, 1942.

6895. Johnston, H. F. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for October to December, 1942, and Summary for Year 1942. Terres.Magnet. and Atmos. Elect., vol 48, no. 1, March 1943, Baltimore, pp. 19-27.

Tables are given. - W. A.

6896. Kalaschnikow, A. G. Die Hysteresis der schwachmagnetischen Sedimentgesteine (The Hysteresis of Weakly Magnetic Sedimentary Rocks). Comptes rendus (Doklady) de l'Académie des Sciences de l'U.R.S.S., Moscow, new ser., vol. 29, no. 5/6, 1940, pp. 368-371.

Experiments were made to test the view that weakly magnetic sedimentary rocks are paramagnetic or diamagnetic. Sandstones interspersed with layers of sand were used as samples; one part of them behaved in strong fields paramagnetically, the other diamagnetically. It was found that in all samples the specific magnetic susceptibility varied with changes of the magnetic field. Moreover, a residual magnetism was discovered that made it possible to construct a hysteresis curve for weakly magnetic rocks; the author interprets hysteresis by the presence in these rocks of ferromagnetic, paramagnetic, and diamagnetic components. The results indicated that samples diamagnetic in strong fields showed a reduction of the susceptibility coefficient in weak fields and even changed to positive values. In most samples the ferromagnetic components reached their magnetic saturation in fields of an intensity of some 700-800 oersteds; in fields of greater intensity some samples became paramagnetic, others diamagnetic. The writer concludes that for the interpretation of magnetic anomalies only those coefficients of susceptibility which were established in magnetic fields of an intensity approximating that of the earth should be used in geophysical calculations. - V. S.

6897. Petsch, B. C. The Medicine Butte Anticline. South Dakota Geol. Survey Rep. of Investigations 45, Vermillion, S. Dak., 1942, 24 pp.

In 1940-42 the South Dakota Geological Survey investigated the large manganese deposit of the Medicine Butte anticline near Chamberlain, S. Dak. As a part of this investigation, E. L. Tullis made a geophysical survey with the magnetometer (see Geophys. Abs. 109, no. 6510). The magnetic variations of the region were found to correspond to its structural configurations. - V. S.

6898. Randell, J. T., Jr. Theoretical and Practical Magnetometric Comparisons. Canadian Min. and Met. Bull., Montreal, no. 355, 1941, pp. 495-512.

Theory governing measurements of the earth's magnetic field and the construction and use of various instruments for that purpose are discussed. Results of measurement in several different areas are given. Results from the Hotchkiss and Askania in another. - J.E.G., Ann. Bibl. Econ. Geol., 1941, vol. 14, no. 2, 1942.

3. SEISMIC METHODS

6899. Explosives Engineer. Case History of a Seismic Shot, Wilmington, Del., vol. 20, no. 4, 1942, p. 1113.

A good example of a seismic reflection record provided by Mr. W. O. Price from work in the Lisbon oil field of Northern Louisiana. Reflections are shown from three horizons. - D. W., Mines Mag., vol. 33, no. 4, 1943.

6900. Gamburtsev, G. A. Correlation Method for the Registration of Refracted Waves (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Ser. Geog. Geophys., Moscow, no. 1/2, 1942, pp. 26-47.

In surveys made by the seismic method of refracted waves each successive wave must be isolated and observed; a correlation of successive wave appearances is important, even when the geological interpretation of observations is based only on the first appearances. The follow-up of first and succeeding appearances of refracted waves should be effected by devices analogous to those used in the method of reflected waves, such as (in particular) correlation by phases. The author states the essential requirements in regard to apparatus, means of producing explosions, methods of observation, etc.; one of the principal requirements is to increase the effective sensitivity of seismic apparatus, as it is possible to maintain a uniform record for repeated explosions only with a highly sensitive apparatus. At the end are given the main conclusions derived from the first experiments made by means of the correlation method. - V. S.

6901. Heck, N. H. What Geodesy Can Tell Us About Immediate and Ultimate Causes of Earthquakes (first paper in a symposium, The Interior of the Earth Viewed in Relation to Earthquake Causes). Jour. Appl. Physics, Lancaster, Pa., vol. 14, no. 3, 1943, pp. 104-114.

The writer explains earthquakes from a geodetic viewpoint. This approach is valuable because the crust of the earth is the seat of most earthquakes and an important part of the earth's interior. Geodetic measurements explain mainly the immediate causes of earthquakes. The methods of triangulation and leveling make it possible to furnish information about the movements of the crust by measuring the extent of surface slipping; they have provided the basis for the elastic rebound theory. The ultimate causes of earthquakes can be partly explained in terms of isostasy. However, isostatic compensations need to be reinforced by other forces to cause earthquakes, because important isostatic adjustments have taken place without earthquakes. The regidity of the rust, earth tides, polar shifts, etc., may be contributing auses. Meinesz, Visser, Gutenberg, and Richter find that earthuakes tend to occur in belts of negative anomalies associated ith deep ocean troughs. (The other papers of the present ymposium are abstracted under nos. 6902, 6904, 6905, 6906, 6907, nd 6925.) - V. S.

902. Hodgson, E. A. What seismology Can Tell Us About the Structure of the Earth's Interior (third paper in a symposium, The Interior of the Earth viewed in Relation to Earthquake Causes). Jour. Appl. Physics, Lancaster, Pa., vol. 14, no. 3, 1943, pp. 121-125.

Seismological evidence points to the existence of shallow nd deep foci of earthquakes. Shallow foci are generated by the obility of the earth's surface. This mobility results from rocesses which are enumerated. When the operation of these rocesses is resisted by friction, the accumulating energy ultiately produces an earthquake, so the "elastic rebound" theory aintains. Deep foci have been recognised only during the last 0 years. They reach to depths of about 700 km. and their existnce can now be considered well-proved. Various criteria for dentifying deep foci are cited. The deep foci now recorded are onfined to five regions: Japan, the Netherlands East Indies, ew Guinea, the New Hebrides, and the western part of South merica; the deep foci lie farthest from oceanic deeps, and the hallow foci nearest to them. The author gives his explanation of eep foci. (The other papers of the present symposium are bstracted under 6901, 6904, 6905, 6906, 6907, and 6925.) - V. S.

903. Housner, G. W. Calculating the Response of an Oscillator to Arbitrary Ground Motion. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 31, no. 2, 1941, pp. 143-149.

The response of a simple oscillator to arbitrary ground otion may be determined by graphical or mathematical methods. he writer describes the mathematical methods. He uses Lord ayleigh's "principle of superposition," which states that if wo exactly similar oscillators are each acted upon by a different orce, then adding the motion of the first oscillator to that of he second oscillator results in the same motion as would occur f both forces acted upon a single oscillator. By induction, this esult can be extended to any number of forces. The case of an scillator acted upon by a continuously varying force, the ground cceleration. The author gives the derivation of several quations and discusses their solution and application. - V. S.

6904. Hubbert, M. K. Discussion of The Interior of the Earth Viewed in Relation to Earthquake Causes. I. What Geodesy Can Tell Us About Immediate and Ultimate Causes of Earthquakes. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, no. 1, 1943, p. 115.

(See Abs. 6901.) Hubbert supports the view that isostatic adjustment cannot be a primary cause of earthquakes. He gives two reasons for such a conclusion. First, the process of mountain erosion is irreversible and cannot of itself produce a new mountain. When an existing mountain is reduced to a peneplane its potential energy is spent, and it is not available as the potential energy of a new mountain; a new supply of energy is necessary for such process. Second, isostatic adjustment and the erosion of a mountain have a different duration: "The time required to achieve any degree of isostatic equilibrium is of the order of 10^{-3} of that required for the corresponding approach to erosional completion." From these considerations, the author concludes that the cause of earthquakes lies in some large supply of energy, deep-seated within the earth, compared with which isostatic adjustment is relatively unimportant. - V. S.

6905. Lynch, Joseph. What We learn from Thermodynamics (sixth paper in a symposium, The Interior of the Earth Viewed in Relation to Earthquake Causes). Jour. App. Physics, Lancaster, Pa., vol. 14, no. 3, 1943, pp. 134-136.

Thermodynamics tends to support the view that the interior of the earth is largely solid. The thermal gradient is about 30°C. per kilometer at the surface of the earth, and it may be assumed to continue to the center with decreasing steepness. The melting point of rocks averages about 1400°C. at the surface and increases with pressure and hence with depth. The increase amounts to about 3°C. per kilometer; Bridgman has found indications that it continues throughout the earth, but at a slower rate. If the earth were originally a molten mass then, as shown by Jeffreys, the temperature gradient of such a liquid shpere would be about 0.3°C. per kilometer. Actually, the melting-point gradient is 10 times greater than this figure, namely, 3°C. rise per kilometer. Hence, a solidification of the earth would start not at the surface but at some depth. Similar deductions lead to the conclusion that the core of the earth is solid. If the solidification temperature of rocks at the surface is 1,400°C. and the melting-point gradient begins rising from 3°C. per kilometer from the surface down, the solidification temperature of 2,000°C. is attained at the depth of 200 km. and it must be higher than 2,000°C. at the core. Since the actual temperature of the core is generally estimated at 2,000°C. the core must be solid. Reviewing the other papers of the symposium, the writer finds that they support this view. (These papers are abstracted under nos. 6901, 6902, 6904, 6906, 6907, and 6925.) - V. S.

6906. Lynch, W. A. Measurements of Terrestrial Magnetism Tell Us Little About Earthquakes but May Tell Us Much About the Interior of the Earth (fourth paper in a symposium, The Interior of the Earth Viewed in Relation to Earthquake Causes). Jour. Appl. Physics, Lancaster, Pa., vol. 14, no. 3, 1943, pp. 127-130.

Magnetism is not a cause of earthquakes; the necessary energy is not present, and no agency is known that could accomplish the transformation from magnetic to mechanical energy. Magnetism may, however, supply some information about the interior of the earth. It is known that ferromagnetic substances loose their magnetization at the Curie point: 780°C. for iron, 580°C. for magnetite, and 350°C. for nickel. The Curie point is raised by increased pressure, but this rise is believed to be slight. It is also known that temperature increases with depth near the surface of the earth at the rate of 30°C. per kilometer. Accordingly, all ferromagnetic substances may loose their magnetic properties at depths greater than 25 km., so that the seismologists' core of the earth would not be magnetic. Recent studies of Goranson, McNish, Van Orstrand, and Gutenberg have tended, however, to reduce the change of temperature with depth and to increase the rise of the Curie point with pressure. On this evidence, the core of the earth may be a ferromagnetic mixture of nickel and iron. (The other papers of the present symposium are abstracted under nos. 6901, 6902, 6904, 6905, 6907, and 6925.) - V. S.

6907. Macelwane, J. B. Tectonophysics or the Physics of Earth Deformation (fifth paper in a symposium, The Interior of the Earth Viewed in Relation to Earthquake Causes). Jour. Appl. Physics, Lancaster, Pa., vol. 14, no. 3, 1943, pp. 131-133.

Tectonophysics is defined by the author as the physics of earth deformation. Experiments of F. D. Adams, L. H. Adams, Bridgman, Griggs, Birch, and others, conducted with graphite, silica glass, silver, mica, and so on, have shown that the characteristics of materials and the mechanics of their deformation change with different conditions. Accordingly, the deformation of a geological structure under a given system of forces depends not only on the physical and chemical environment, geometric configuration, and boundaries, but also on the typical behavior of each individual material. The author concludes that an explanation of earthquakes in terms of elasticity is insufficient. Other considerations must be included, such as the fluidity, plasticity, and resistence of specific metals and rocks. (The other papers of the present symposium are abstracted under nos. 6901, 6902, 6904, 6905, 6906, and 6925.) - V. S.

6908. Mukherjee, S. M. Seismological Features of the Satpura Earthquake of the 14th March, 1938. Proc. Indian Acad. Sci., Bangalore City, no. 16, part A, 1942, pp. 167-175.

The shock was felt over about 400,000 square miles. The position of the epicenter is calculated as 21° 31'N. and 75° 50'E. and the time of origin as $0^h48^m30^s$ G.M.T. The depth of focus is calculated as 40 km. The magnitude of the shock was about 5.5 and energy about 10^{19}ergs. Velocities of the various crustal waves are given. - Author's abstract.

6909. Neumann, Frank. An Appraisal of Numerical Integration Methods as Applied to Strong-Motion Data (third paper in The Determination of the True Ground Motion by Integration of Strong-Motion Records: A Symposium). Bull. Seismol. Soc. Am., Berkeley, Calif., vol. 33, no. 1, 1943, pp. 21-60.

The computation of earthquake motions from accelerograms involves primarily numerical integration. The author discusses the double-integration methods of calculating displacement curves, their practicability, and a system of checks. He then reviews the results of these methods as applied to the shaking-table tests at the Massachusetts Institute of Technology (see Abs. 91, no. 4011) and at the National Bureau of Standards (see Abs. 88, no. 3586). The pivot-type accelerometer is found satisfactory from an engineering viewpoint, and wave forms in terms of displacement can be accurately computed for all but the longer-period waves. A comparison is further made between displacement curves computed from accelerograph records by numerical double integration and the curves obtained by means of a torsion pendulum analyzer. Pendulum results deviate from numerical integration only by half the smallest displacement error found in the M.I.T. shaking-table tests, but they are subject to some uncertainty at the beginning of the motion (see Abs. 106, no. 6153; abs. 94, no. 4436; and Trans. Am. Geophys. Union, 17th Ann. Meeting, 1936). (The other papers of the present symposium are abstracted in nos. 6911, 6912, 6913.) - V. S.

6910. Petroleum World. Over 15 Seismograph Crews in Valley, Los Angeles, Calif., vol. 39, no. 2, 1942, pp. 25-26.

Reviewing present exploration activity in California where 15 seismograph parties are reported as active largely in Fresno and Kings Counties in the San Joaquin Valley, as of early 1942. Current wildcats and recent discovery wells of interest are noted. - D. W., Mines Mag., Denver, Colo., vol. 33, no. 3, 1943.

6911. Ruge, A. C. Analysis of Accelerograms by Means of the M.I.T. Differential Analyzer (fourth paper in The Determination of True Ground Motion by Integration of Strong-Motion Records: A Symposium). Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, no. 1, 1943, pp. 61-63.

The M.I.T. differential analyzer is a machine for the mechanical integration of differential equations (see article by V. Bush, Jour. Franklin Inst., vol. 212, no. 4). It was here used as an integraph for the calculation of strong-motion velocities and displacements. Accelerograms of the shaking-table tests made at the Massachusetts Institute of Technology served as data. The original accelerograms were at first enlarged about 4-1/2 times; they were then fed into the machine set up for first and second integrals of acceleration. The integrals were next converted into velocities and displacements. The results obtained in the form of tabulations of ordinates were plotted, and smooth curves were drawn. Mechanical integration and numerical integration were discovered to be about equal in accuracy and time consumed. Furthermore, the differential analyzer was set for calculating and stamping the response of a damped pendulum. It was found that the differential analyzer and the torsion-pendulum analyzer calculate the pendulum response with about equal accuracy; this response can be satisfactorily substituted for the true displacement. (The other papers of the present symposium are abstracted under nos. 6909, 6912, and 6913.) - V. S.

6912. Ruge, A. C. Discussion of Principal Results from the Engineering Standpoint (second paper in The Determination of True Ground Motion by Integration of Strong-Motion Records: A Symposium). Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, no. 1, 1943, pp. 13-20.

The author discusses an investigation of simulated earthquake motions conducted jointly by the Massachusetts Institute of Technology and the United States Coast and Geodetic Survey by means of shaking-table experiments. He is concerned with the accuracy of strong-motion recording devices from an engineering standpoint. Will the calculated earthquake motions (based on instrumental records) have the same effects on a particular engineering structure as the actual earthquake motions? Comparisons are made between the various curves obtained in the investigation and the following principal conclusions are reached:

(1) The accuracy of Coast and Geodetic Survey accelerometers under simulated earthquake motions is satisfactory,

(2) Displacements and velocities computed by numerical integration agree closely with the actual displacements and velocities,

(3) Integration of accelerograms by the M.I.T. Differential Analyzer agrees well with numerical integration. (The other papers of the present symposium are outlined under nos. 6909, 6911, and 6913.) - V. S.

6913. Ruge, A. C., and McComb, H. E. Tests of Earthquake Accelerometers on a Shaking Table (first paper in The Determination of True Ground Motion by Integration of Strong-Motion Records: A Symposium). Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, no. 1, 1943, pp. 2-12.

The Massachusetts Institute of Technology and the United States Coast and Geodetic Survey have investigated jointly the accuracy of accelerograms of earthquake motions. The investigation was made by means of shaking-table experiments (see Abs. 91, no. 4011). The present paper is the first in a symposium describing the results obtained. It states the objectives of the research and describes the instrumental work. The main objective is to determine the agreement between actual displacements imposed upon the accelerograph by the shaking table and those obtained by integrating the recorded acceleration. The shaking table and its operation were described in a previous article (see Abs. 87, no. 3346). The particular apparatus used in the investigation is now discussed and illustrated by diagrams. 51 tests were made, and 6 accelerograms were selected for analysis. Exanples are reproduced in the test. (The other papers of the present symposium are abstracted in nos. 6909, 6911, and 6912.) - V. S.

6914. Ulrich, F. P. Progress Report on Strong-Motion Earthquake Work: January, February, March, 1943. United States Coast and Geodetic Survey, MSP - 44, 1943, 2 pp.

During the first quarter of 1943 the Coast and Geodetic Survey has continued its work, which the present report summarizes under the headings: (1) Questionnaire program; (2) Strong motion work; (3) Vibration work: and (4) Principal earthquakes: February 22 and March 30, 1943. - V. S.

6915. Wingate, E. G., and Finch, R. H. Eruptions of Mauna Loa, April 26 to May 10, 1942. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, no. 1, 1943, pp. 65-67.

This press notice describes the Mauna Loa earthquakes in regard to such details as time sequence, progress of cracking, succession of shocks, direction of the lava flow, rate of flow, danger to Hilo, unsuccessful bombing with a view to diverting the lava, natural diversion of the flow, termination of eruptions, and seismological records. The principal feature of the summit

ruption was a lava flow that coursed a few miles down the
orthern slope of the mountain. On the northeast, the cracks
xtended 2 miles below the source of the flow; the lava fountains
ere three-fourths of a mile long. The distance across the flow
rom Hilo to Puna was more than 1,000 yards. The front of the
low averaged at least 25 feet thick. The principal earthquake
eached a depth of some 30 miles. During the period April 5 -
ay 10 the seismic-disturbance records ranged from 9 to 539 per
eek. - V. S.

4. ELECTRICAL METHODS

16. Bowsky, M. C. Correlation by Electrical Logs. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 8, no. 2, 1942, pp. 28-29.

The purpose of this article is to point out some methods
at might assist in the correlation of electrical logs. In
hoosing the type of curve the resistivity of the drilling mud
the decisive factor. Generally, the mud is suitable for both
e normal potential curve and the normal apparent resistivity
rve (otherwise called shallow penetration resistivity curve);
t in cases where the mud has extremely low resistivity the
ormal apparent resistivity curve alone must be used. Corre-
tion work should begin with a general review of the log. In
entifying the various sands in a group, the logs may be lined
so that the sands are level. When the electrical logs are
orrelated with sea level, they may indicate the regional dip
d the convergence or divergence of formations. An amplification
the response of the normal apparent resistivity curve is
lpful in correlating long shale sections. Bentonite streaks
n be characteristic of a certain depositional history and
come excellent geological markers. - V. S.

17. Grier, A. J. The Standard Geo-Electric Set. Pamphlet, Berkeley, Calif., December 31, 1941.

A pamphlet describing the standard geo-electric set made by
tandard Geophysics of 1684 University Avenue, Berkeley, Calif.,
ich is a self-contained instrument for determining potential
op ratios of successive adjacent portions of the ground between
ree electrodes while current from auxiliary batteries flow
tween two current electrodes. The instrument is described, and
sults of a traverse across a quartz vein shown. - D. W., Mines
g., Denver, Colo., vol. 33, no. 3, 1943.

18. Mining Journal. Barry Storm Credits M-Scope in Finding Copper Deposit, Phoenix, Ariz., vol. 25, no. 24, 1942, p. 16.

A brief report of the location of a lode of copper ore some 2 miles north of Apache Lake, in the Superstition - Four Peaks region east of Mesa, Arizona. Mr. Storm, who was awarded the title "Model Prospector of 1941" by the Phoenix (Ariz.) Engineers Club, credits the discovery to the M-Scope, a portable electromagnetic induction instrument which he used in investigating the property. The find was made within about 50 feet of an old pack trail, and a 50-foot exploration shaft has shown a steady rise in values. The instrument and its operator are shown in photograph. - D. W., Mines Mag., Denver, Colo., vol. 33, no. 3, 1943.

6919. Sherborne, J. E., and Newton, W. M. Mud Resistivity in Electric Logging. Petrol. World, Los Angeles, Calif., vol. 38, no. 12, 1941, p. 58.

Brief comment on discussion at A.I.M.E. meeting concerning the relation of the resistivity of chemicals used in treating drilling mud to results of electrical logging. Resistivity of mud was concluded to have an important effect on such logs. - D. W. Mines Mag., Denver, Colo., vol. 33, no. 3, 1943.

6920. Stick, J. C., Jr. Modern Instruments Provide Speed and Accuracy in Electrologging. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 9, no. 1, 1943, pp. 28-29.

Electrical logging has been recently perfected by the addition of new devices to equipment. Advances in radio have resulted in the development of galvanometers capable of a recording speed up to 300 feet per minute, with extreme accuracy. The copper collector rings, which transmit the electrical current from the cable hoist drum, have been replaced by metal disks revolving in pools of mercury. The Eastman Kodak Co. has developed a prehardened survey recording film which can be hand-processed at temperatures in excess of 100°F., does not stain, dries quickly, and withstands the most severe handling; a field print may be obtained within a few minutes. As a result of new improvements, electrical logging has gained in speed and precision. - V. S.

6921. Stick, J. C., Jr. Types of Electrical Measurements in Electrical Logging. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 8, no. 1, 1942, pp. 4-7, 29.

Three main types of measurements are used today in commercial electrical logging: (1) Measurements of natural electrical voltage between different formations in a borehole, expressed by a natural potential curve; (2) measurements of electrical resistivity close to the borehole, within the zone infiltrated by the rilling mud, expressed by a shallow-penetration resistivity urve; and (3) measurements of formations to indicate their atural resistivity behind the zone of mud infiltration, expressed y a deep-penetration resistivity curve. The author discusses ach curve, the ways of increasing its precision, and the resis- ivity formula. The natural potential curve is precise when easurements are made with the use of pure lead electrodes, omparatively large electrode surfaces, and a down-the-hole round. The shallow penetration resistivity curves are of two ypes: (a) The detail curve measures the formation resistance etween a single exploring electrode and a suitable ground return lectrode, (b) the averaging curve measures the resistivity of ormations exceeding a specific thickness, the thinner formations eing averaged out; the electrode spacing is so chosen that the ormation averaging effect is greater than that obtainable with he detail type. The deep-penetration resistivity curves range n lateral depth of penetration from 6 feet to 25 feet. To in- rease the accuracy of response to thinner formations, the amount f formation within the zone of measurement is greatly reduced ver equivalent single potential-type spacings by placing the otential pick-up electrodes close together. - V. S.

922. Stick, J. C., Jr., Winter, A. B., and Bowsky, M. C.
Shallow Penetration Curves. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 8, no. 2, 1942, pp. 16-19.

This paper deals with the practical uses of shallow-pene- ration resistivity curves, the detail curve and the averaging urve. The uses are: (1) Differentiation among formations; 2) correlation; (3) determination of depth of formation; and 4) study of the physical characteristics of strata. The writers iscuss the principal applications. The differentiation between hales and all other formations is possible because shales have ow resistivity and permeability, while the resistivity of other ormations depends on their permeability, original resistivity, nd infiltration by borehole fluid. The type of curve must be hosen according to the minimum thickness of formation to be ndicated. The minimum thickness to which the averaging curve esponds is equal to the depth of lateral penetration of the urve. In problems of correlation the shallow-penetration curves an be profitabley used because of their extreme range of measure- ent. Averaging curves have the advantage of reducing excessive etail where intricate interbedding of formations complicates orrelation of the major zones. Detail curves are valuable ecause they pick up small changes of formation character. - V. S.

923. Winter, A. B., Bowsky, M. C., and Stick, J. C., Jr.
Correlation between Electrical Logs and Radioactivity Logs. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 8, no. 3, 1942, pp. 4-7.

There are two types of curves in radioactivity logging: (1) The gammaray curve, which is a measure of the natural gamma-ray intensity of the formation; and (2) the neutron curve, which measures the intensity of the gamma rays resulting from the bombardment of the formations with a strong source of neutrons. These radioactivity logs can be usefully correlated with an electrical log. Undoubtedly, the electrical log and the radioactivity log, being measurements of entirely different properties of the formations, have totally different response characteristics. However, if the typical response for the various types of formations on the gamma-ray curve or neutron curve is understood, it is possible to correlate the gamma-ray curve or the combination gamma-ray and neutron curve readily with the electrical logs from well to well. The distinctive characteristics of radioactivity logs and adjustments in the scale sensitivity of their curves are discussed. Attention is likewise paid to the problem of distinguishing between sands and limestones. - V. S.

6924. Zinszer, R. H. The Use of Electrode Spacing in Well Logging. Am. Inst. Min. and Met. Eng. Tech. Pub. no. 1590, New York, 1943, 10 pp.

Application of electric logs has been used in correlation of subsurface structure to determine the size and shape of the oil reservoir. Such a knowledge is hardly complete until saturation and productivity are determined for the various horizons. It is difficult to use electric logs successfully for this purpose because of the many factors that influence the curves. In this work an effort was made to establish an empirical correlation between formation resistivity for a series of electric-log curves and water saturation and oil productivity of sand. Electric logs were obtained by recording with 10 different electrode spacings through the same interval of a well. In the analysis of these curves all factors except two, a dependent and independent variable, were analyzed in the core laboratory in order to compare the values of permeability and saturation with the measured values of formation resistivity.

Results of this analysis indicate : (1) the depth to which mud filtrate enters a sand body, (2) a correlation between permeability and sand resistivity for shallow penetration depths, and (3) that the water saturation for an oil sand can be determined from the measured sand resistivity after making suitable corrections for sand thickness. The procedure in the last method depends on a correction for thickness factor and a theoretical curve. The accuracy of the theoretical curve is now being tested in the laboratory. - Author's abstract.

5. RADIOACTIVE METHODS

925. Barklow, J. C. Radioactivity Well Logs - Their Use and Applications. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 7, no. 5, 1941, pp. 4-5.

The major oil deposits in the United States are being rapidly ound and drilled. Therefore, much more attention will have to be evoted in the future to secondary recovery in the existing pools. resent economic conditions in the oil industry indicate that his must be done at a relatively low cost. The author considers hat radioactivity well logs present an answer to a large part of his problem. Much experimental work has been done in applying adioactivity to well logging. Advances were also made in the echnique of producing radioactivity logs. With growing use, any applications are being developed. The principal application s made in wells cased and exploited to capacity at their present roducing horizon. Radioactivity logs may also be utilized for apping subsurface structure for deeper drilling. Where core rilling is proposed, preliminary shallow holes may be used, urveys made, and radioactivity logs correlated at reduced cost. ometime a radioactivity log may be used where an electric log ails. The many advantages of radioactivity logs assure them prominent future in the petroleum industry. - V. S.

926. Beers, L. C. Radioactivity Logging reclaims Depleted Wells in the Long Beach Field, California. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 8, no. 1, 1942, pp. 12-13, 31.

The petroleum industry faces the problem of increasing oil roduction for national defense in spite of the sharply reduced llotment of steel pipe and equipment. In this situation, the eworking of old wells with a minimum equipment assumes increased mportance. Radioactivity logging answers this problem optimally. he difficulties of locating new shallow zones in old wells are urmounted by logging strata through the casing. Many California roducers have developed comprehensive work-over programs utilizing this method. The author describes the application of adioactivity logging in the Long Beach field, California, and utlines the procedure which gives the best results in the field. his procedure is low in cost and requires little or no new quipment. - V. S.

927. Beers, L. C. Radioactivity Logs in Cased Wells correlate with Gun-Barrel Formation Samples. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 7, no. 9, 1941, pp. 4-5.

Radioactivity logging is increasingly regarded as essential to profitable work-over programs in oil fields. The normal procedure is first to run the radioactivity log to locate the potential oil bearing strata. Sands are relatively low in radioactivity, limestones are of intermediate strength, and shales are relatively high in radioactivity. The radioactivity log is compared with the driller's log and the sample log of the well, and also with the general statigraphic sequence and productive history of the area. Then all the sands and limes are tested progressively from the bottom upward, until a satisfactory horizon is located for operation. A high degree of correlation has been found between radioactivity logs and gun-barrel formation samples. Formation samples are carefully recovered behind the casing from gun barrels and chambers and they are subjected to microscopic analysis. In all the instances studied such a sample log of perforations agrees very fully with the radioactivity log of the well. - V. S.

6928. Cantrell, Ralph. Radioactivity Logs Aid in Making Gulf Coast Work-Overs Worth While. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 8, no. 2, 1942, pp. 12-13.

Radioactivity logging can be made through the casing. It employs a highly sensitive detector which measures the gamma rays that enter the hole from the adjacent formations. An ionization current produced by these rays is amplified and transmitted to recording equipment at the surface. As the instrument is pulled up the hole, the gamma ray intensities of the formations are recorded on a paper chart. The writer gives five examples of the application of radioactivity logging to work-over programs in Texas and enumerates other possible uses. The full scope of the adaptability of the radioactivity log is probably not yet fully realized. - V. S.

6929. Hess, V. F. What Radioactivity Tells Us About the Interior of the Earth (second paper in a symposium, The Interior of the Earth Viewed in Relation to Earthquake Causes). Jour. Appl. Physics, Lancaster, Pa., vol. 14, no. 3, 1943, pp. 116-120.

The heat production of the radioactive substances embedded in the rocks is very important for the treatment of the problem of the cooling of the earth. Recent average results of Evans, Goodman, and others are much lower than previously accepted figures.

It is pointed out that if one computes the ionization produced by the gamma-rays from radioactive substances in rocks and soil from Evans and Goodman's figures, the expected ionization urns out considerably smaller than the one actually observed by lacing ionization vessels over land and water. An experimental tudy of this discrepancy is planned.

It is shown that plausible assumptions as to a layered depth istribution of radioactive matter lead to temperatures in the ore of only 2,000°C., even if the older and higher data for the adioactive heat production in the rocks are accepted. A gradual eating of the core itself is to be expected (Slichter) if the mount of radioactive matter in the core is not smaller than that n iron meteorites. - Author's abstract.

The other papers in the present symposium are abstracted nder nos. 6901, 6902, 6904, 6905, 6906, and 6907.

930. Neale, J. J. Proper Completion Assured by Radioactivity Logs. California Oil World and Petrol. Industry, Los Angeles, Calif., vol. 36, no. 6, 1943, pp. 10-11; also Tomorrow's Tools - Today, Los Angeles, Calif., vol. 9, no. 1, 1943, pp. 22-23.

To insure the proper placement of gun perforations, some perators are running a gamma-ray (radioactivity) log before oing any gun perforating at all. Radioactivity logging can be ade through the casing by moving a highly sensitive detector in he well. The gamma rays originating in the formation pass hrough the casing and cement and identify the character of the ormation. The instrument consists of an ionization chamber bove which is an amplifier. An ionization current produced in he chamber by the gamma rays is transmitted to the surface, here a gamma-ray curve is traced. From this curve formational onditions are interpreted and their depth accurately determined. he author gives examples of wells which show that radioactivity ogging more than repays its cost. - V. S.

931. Uren, L. C. Radioactivity and Geochemical Well Logging. The Petroleum Engineer, Dallas, Tex., vol. 14, no. 4, 1943, pp. 50-58.

The author discusses radioactivity logging in respect to heoretical basis, equipment, interpretation, utility, distinction etween gamma-ray logging and neutron logging, and subsurface adioactivity study. He further treats of geochemical logging n regard to theoretical basis, formation sampling, chemical nalysis, graphical method of displaying data, interpretation of ogs, and evaluation of geochemical logging. The first article see Geophys.Abs. 113, no. 6814) dealt with electrical logging; n the forthcoming articles the writer proposes to discuss aliper logging, temperature logging, rate-of-penetration logging, nd logging by inspection of the drilling fluid. - V. S.

6932. Winter, A. B. Use of Neutron Curves. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 8, no. 4, 1942, pp. 14-15.

The neutron curve is generally used as a companion curve to the gamma-ray curve in radioactivity logging. It has been found to aid in determining the character of the formation behind casing The equipment used for neutron logging is described. Satisfactory logs may be made with or without fluid in the hole. The uses of neutron logging are several. One application is the determination of dense limestones or hard sandstones. Another is the detection of porous zones in a uniform limestone formation: it is made possible by the presence of oil or water in the pores. To detect porous zones both the gamma-ray curve and the neutron curve are necessary: gamma rays show thickness, while low neutron values indicate porosity. Shales have still lower values on the neutron curve. A third application of the neutron log is the determinatio of the casing seat. The point of entering or leaving a string of casing is not always apparent on a gammay-ray curve. - V. S.

Winter, A. B., Bowsky, M. C., and Stick, J. C., Jr. Correlation Between Electrical Logs and Radioactivity Logs. See Abstract 6923.

6. GEOTHERMAL METHODS

6933. Winter, Burm. Accuracy in Temperature Surveys necessary for Successful Application. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 8, no. 1, 1942, pp. 20-23.

With the increasing depth of oil wells the study of subsurface temperatures grows in importance. At present, greater precision has been gained in temperature surveys by the use of the resistance-element type of thermometer. This apparatus records temperatures at the surface as the thermometer passes down the hole. The equipment is described. Temperature surveys have several applications. One commercial application is the location of the tip of the cement behind the casing following a cement job Owing to generation of heat in the setting of cement, a definite change in temperature occurs opposite the cemented zone; the kind and nature of the formation covered by the cement will influence the temperature indications. Other applications of temperature surveys are enumerated= - V. S.

7. GEOCHEMICAL METHODS

6934. Henderson, Homer. Surface Analysis Can Now Tell Hydrocarbon Source. Oil Weekly, Houston, Tex., vol. 109, no. 5, 1943, pp. 49-50.

The increasing demand for oil, the draining of existing fields, and the diminishing discovery rate make it imperative to find a cheap but efficient oil-prospecting method. Microscopic surface analysis gives promise of being such a method. The presence of hydrocarbons on the surface in the form of oil springs, gas seeps, and "paraffin earth" has for a long time been accepted as an indication of oil at depths. Hydrocarbon molecules leak off from subterranean petroleum deposits and slowly rise to the surface. The main difficulty of microscopic detection is to differentiate between petroleum hydrocarbons and surface hydrocarbons generated by decaying vegetables. This differentiation is extremely difficult by chemical methods. But a physicochemical method has been developed which utilizes the physical, geological, and chemical characteristics of surface hydrocarbon concentrations, such as saturation, configuration, geological substratum, etc. - V. S.

6935. Smith, G. K. Surface Analyses of Hydrocarbons a New Development of Oil Analysis. International Oil, Houston, Tex., vol. 3, no. 1, 1942, pp. 71-73.

A general discussion of soil-analysis prospecting in which surface distribution of hydrocarbons is examined. A method that distinguishes between hydrocarbons diffused from petroleum and vegetable waxes, called a "physicochemical" method, is mentioned and its advantages pointed out. Three figures showing surface hydrocarbon distribution over different geological situations are given. - D. W., Mines Mag., Denver, Colo., vol. 33, no. 3, 1943.

6936. Smith, R. O. Geochemistry's Place in Future Exploration. World Petrol., New York, vol. 14, no. 3, 1943, pp. 45-47, 49.

The chief difficulty of geochemical prospecting is identifying the surface hydrocarbons traceable to oil deposits. In Russia it has been possible to utilize the ratio of ethane to methane in the gaseous hydrocarbons of oil; in America oil hydrocarbons are of a less reactive type, and the chemical problems become more complicated. There exist also other difficulties. Lime strata sometimes cause concentrations of hydrocarbons of noncommercial proportions, so that it is necessary to distinguish between oil fields producing from lime and from sand. The apparent structure may shift with depth, probably in the direction of the convergence of strata, so that the oil prospect does not exist directly under the surface zone indicated by a geochemical survey. Some hydrocarbons come up more vertically than do others. As a result, geochemistry cannot at present outline an oil field with precision. The most promising mission of geochemistry is the detection of new fields. Where adequate surveys have been made, 4 wells have come in out of every 10 recommended. - V. S.

Uren, L. C. Radioactivity and Geochemical Well Logging. See Abstract 6931.

6937. ZoBell, C. E. Influence of Bacterial Activity on Source Sediments. Oil Weekly, Houston, Tex., vol. 109, no. 8, 1943, pp. 15-26.

Microbiological exploration for petroleum is based on the role of bacteria in the formation of oil deposits. Some bacteria may promote the conversion of organic matter into crude oil, others may prevent it. A discussion is given of the effects of bacterial activity on the chemical composition of sediments. Much further information is necessary in regard to the formation of protopetroleum and environmental conditions before microbiological prospecting can be fully utilized. The transformation of organic matter into petroleum is the subject of American Petroleum Institute Research Project 43A, carried on jointly by the Scripps Institution of Eceanography, the Pennsylvania State College, and the Massachusetts Institute of Technology. - V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

6938. American Petroleum Institute. Committe Reports on Petroleum Reserves in 1942. Quarterly, New York, vol. 13, no. 2, 1943, pp. 3-4.

Proved reserves of crude oil in the United States, as of December 31, 1942, amounted to 20,082,793,000 barrels, which is 493,497,000 barrels higher than estimates of January 1, 1942. This increase is the net result of the discovery and development, through extensions and additions to pools discovered in previous years and through the discovery of new pools in 1942, of a total of 1,878,976,000 barrels of new oil as against 1,385,479,000 barrels of crude oil produced during the year. It must be recognized, however, that today's known oil can be recovered only over a period of many years and at gradually declining annual rates. Two tables accompany the report of the Committee: (1) Estimated proved petroleum reserves in the United States, and (2) summary of committee's annual reports covering period 1937-42. - V. S.

6939. American Petroleum Institute. Not Enough Oil Found Last Year, Says Boyd. Quarterly, New York, vol. 13, no. 2, 1943, p. 5.

William R. Boyd, Jr., president of the American Petroleum Institute, finds that the United States petroleum industry did not find nearly enough oil in 1942. This conclusion is supported by the report of the A.P.I. Committee on Reserves and the report

f the Petroleum Administrator for War. The report of the A.P.I.
ommittee shows a total addition to reserves in 1942 of
,878,976,000 barrels of crude oil, less the consumption of
,385,479,000 barrels during the year. However, only 260,051,000
arrels of the total was from the new fields discovered in 1942.
his amount is substantially smaller than the volume of discover-
es from new fields in any recent years and compares unfavorably
ith the average estimate of 559,243,000 barrels for each of the
ast 5 years. - V. S.

940. DeGolyer, E. L. Problem of Exploration. Bull. Am. Assoc.
Petrol. Geol., Tulsa, Okla., vol. 26, no. 7, 1942,
pp. 1214-1220.

The estimates of United States oil reserves are reviewed and
ound discomforting. The rate of discovery declines. Exploratory
echniques have limits of usefulness; they gain acceptance slowly,
each a peak rapidly, and then lapse into relative obscurity;
xamples are given. The task facing the oil industry is to find
ew exploratory methods and new fields. - A. L., Jour. Inst.
etrol., vol. 29, no. 230, 1943; condensed by V. S.

941. DeGolyer, E. L. Problem of Exploration during the War.
Oil Weekly, Houston, Tex., vol. 109, no. 5, 1943, pp. 39-41.

The essential facts in the present oil situation are as
ollows: (1) War and civilian consumption of petroleum may be
xpected to increase. In 1942 the demand was roughly
,400,000,000 barrels; for the next 2 or 3 years, not less than
,500,000,000 barrels will be needed annually; in subsequent
ears still more may be required. (2) The current rate of
inding oil is too low. The disappointing results of existing
ethods of exploration are not due to a slackening of efforts,
or intelligently directed exploration is at an all-time peak.
or are these results due to a decrease in the total number of
ewly discovered fields, because in 1939-42 nearly 215 discover-
es were made annually, while in 1935-38 the average was 130
iscoveries. (3) The answer appears to lie in the rate at which
he large fields are discovered. The most recent estimates of
he average new oil discovered per field are 15,600,000 barrels
or 1935-38, and 3,200,000 barrels for 1939-42. (4) Our present
rop of prospects is not encouraging in size and quality. The
verage size of new fields discovered in 1942 is now estimated
o be 1,200,000,000 barrels; further development of these fields
ill undoubtedly increase this estimate but not to an extent
omparable with returns before 1939. Without new discoveries
ur productive capacity will be inadequate by the end of the
ear. (5) Apparently the areas susceptible to existing methods
f exploration have been largely discovered, and new methods

should be found. In the future, attention must be directed predominantly at stratigraphic traps, and all known means of exploration must be employed in increasing our finding rate. Increased exploratory funds and more cooperation will be necessary to accomplish this purpose. - V. S.

6942. Eckhardt, E. A. Geophysical Operations at Peak Levels during 1942. Oil Weekly, Houston, Tex., vol. 109, no. 5, 1943, pp. 49-50.

In 1942 the distribution of geophysical parties by type of exploration was as follows: seismograph, 75 percent; gravimeter, 19 percent; magnetometer, 5 percent; other methods, 1 percent. The average number of seismographic parties in the United States was, for the last 5 years: 202 in 1938, 189 in 1939, 189 in 1940, 191 in 1941, and 226 in 1942; thus, 1942 showed an increase of 18.3 percent over the year 1941. The geographic distribution of exploration was: Texas, 42 percent; Louisiana, 12 percent; Oklahoma, 11 percent; California, 9 percent; Kansas, 4 percent; Southeastern States, 13 percent; illinois Basin, 7 percent; others, 2 percent. Texas also made the greatest contribution to the new reserves discovered in 1942, namely, 40.1 percent. The author gives two charts illustrating the principal figures.

Notwithstanding the high level of geophysical activity, Petroleum Administrator Ickes has reported that since 1938 the petroleum industry has in no year discovered new reserves equaling in volume the crude oil consumed in that year. He has asked the industry to drill 4,500 wildcat wells during 1943, almost 50 percent more than were ever before drilled during 1 year. The geophysical personnel has received, however, no corresponding occupational exemptions from the draft; only 15 percent to 20 percent are given draft deferment. Personnel losses of some geophysical operators reach 40 percent. Therefore, the necessary expansion of the oil industry is not likely to be realized unless the severe shortage of geophysicists is remedied. - V. S.

6943. Explosives Engineer. Explosives under Full War-Time Control. Wilmington, Del., vol. 20, no. 2, 1942, pp. 38-44, 58-60.

The full text of the new Federal Explosives Act and Administrative Regulations issued by United States Bureau of Mines, is given. Much new Law governs handling of explosives and is of interest to geophysical users, details of which are given. - D. W., Mines Mag., Denver, Colo., vol. 33, no. 3, 1943.

6944. Freeman, L. I. Accelerated Discovery through Geophysics. World Petrol., New York, vol. 14, no. 3, 1943, pp. 48-49.

In 1943, the most critical year of the war, only a fraction emains of the United States crude-oil reserves of 20 billion arrels. Therefore, the accelerated discovery of new fields is f paramount importance. Such discovery is the task of geophysicists. Yet, the geophysical personnel and material have een reduced by the demands of the war. The solution of these ifficulties lies in more efficient exploration. Each party ust have its own field of operation suited to its equipment. istrict offices must be authorized to reach quick decisions in aking appraisals, assembling leases, and conducting exploratory rilling. Active consultation and the pooling of information ithin each area must be encouraged. These suggestions involve rocedures never yet used by oil companies, but the present mergency demands a radical change of policies. - V. S.

6945. Goldstone, F. Maintaining an Adequate Level of Geophysical Exploration. Oil and Gas Jour., Tulsa, Okla., vol. 41, no. 48, 1943, pp. 56-61.

The Petroleum Administration has recommended the drilling f 4,500 wildcat wells in 1943. Geophysicists must carry out his program so judiciously that neither steel nor manpower ill be wasted in unjustified drilling. In analyzing this task, he author discusses methods of prospecting, broadening of exploration, need for planning, and shortage of personnel. He considers that geophysics might be utilized in four general ways: (1) Existing techniques can be applied with greater precision o the already explored areas; (2) methods of structural mapping an be taken to new territories inadequately explored in the ast; (3) areas offering particular geophysical difficulties nd so far neglected may be tackled; and (4) new geophysical ethods can be found to revitalize exploration. - V. S.

6946. Heiland, C. A. Mining Geophysics. Eng. and Min. Jour., New York, N. Y., vol. 142, no. 8, 1941, p. 103.

Noting that the birth of mining geophysics dates back to the beginning of the 17th century the writer examines the relative pace of geophysical prospecting in oil exploration and in ining. The factors in relation to the use of geophysics in ining, such as complexity of the problem, effect of topography nd the like, are examined. The future of mining geophysics s considered as lying in systematic large-scale surveys to stablish geologic relationships. Such surveys are already ell begun in the Lake Superior region, in the Rand area of South Africa, and in surveys near present properties and abandoned mines in the search for extensions. - D. W., Ann. Bibl. Econ. Geol. 1941, vol. 14, no. 2, 1942.

6947. Henry, F. R. Alberta Basin becomes Important Factor. Oil Weekly, Houston, Tex., vol. 103, no. 8, 1941, pp. 40-42.

The writer discusses the regional geology and structure of the Alberta Basin and the significance of the recent discovery of commercial oil at the Twin River. Structure in southern Alberta, which sits between Turner Valley and the northern Montana fields. The Alberta Basin has come of age in having passed the 100 million barrels production mark. Structural cross sections of several fields are given and a graphic log and an electrical log of the Spring Coulee structure are presented. The possibilities of the basin in general are treated. - D. W., Ann. Bibl. Econ. Geol. 1941, vol. 14, no. 2, 1942.

6948. Illing, V. C. Geology Applied to Petroleum. Proc. Geol. Assoc., London, vol. 53, no. 3/4, 1942, pp. 150-187.

The writer deals, in part, with oil discovery. He discusses the origin, migration, and accumulation of oil and the types of regional structures in which oil fields are developed. The regional structures considered are: horizontal strata, areas of gently inclined rocks, folded strata, regions of normal faulting, salt-dome regions, and unusual types of structure.- V. S.

6949. Kornfeld, M. M. Shallow Wilcox Accelerates North Louisiana Development. Oil Weekly, New York, vol. 103, no. 2, 1941, pp. 16-25.

Electrical logs of the Wilcox section at Walters, at Olla, and Nebo, three fields opened in north central Louisiana in the past 18 months, are given. The history of the development of this area is given. It appears that magnetic mapping when corrected (presumably for regional effects) shows the top of a regional feature of which the Olla trend is a part. Geophysics adapted to mapping subsurface faulting detail and new geologic conceptions of structure and faulting will play a part in further development of Wilcox trends and production according to the author. Mud analysis logs of the Olla field show maximum oil concentration at 2,310 to 2,321 ft. where good production was obtained. - D. W., Ann. Bibl. Econ. Geol., 1941, vol. 14, no. 2, 1942.

6950. Levorsen, A. I. Declining Rate of Discovery Poses Urgent Problem for Oil Industry. World Petrol., New York, vol. 13, no. 12, 1942, pp. 37-39, 72.

The writer cites statistics showing that during recent years the U. S. oil reserve has been 12 to 15 times the annual production of oil. Yet, only about a quarter or a fifth is producible in the next few years; the rest will be obtained at steadily declining rates over a period of 20 to 30 years. Thus, unless new fields are found, the existing supplies would not meet daily demand for long. Further statistics show that, to maintain the same rate of increase in supply and demand in the next 20 years, with the same ratio of reserve to annual consumption, would require the discovery of a quantity of oil equal to that found in the past 80 years. New fields can be found both in developed areas and partly explored regions. But their discovery will need more vigorous wildcatting, the testing of new methods, and the employment of more geologists and geophysicists. - G.D.H., Jour. Inst. Petrol., vol. 29, no. 230, 1943, condensed by V. S.

6951. Levorsen, A. I. Discovery Thinking. Oil Weekly, Houston, Tex., vol. 109, 1943, no. 6, pp. 11-17, 26; no. 7, pp. 14-17, 20; no. 8, pp. 12-13, 26-28.

Part 1 of this article suggested that if the industry is to discover the huge volumes necessary to keep supply in balance with future demand, it must commence thinking in terms of "big" geology, which means in terms of wholly new oil provinces instead of individual fields, and square miles in place of acres. As examples, two types of geological concepts or principles are presented to show the kind and the scale of thinking that seem to be called for in an attempt to formulate a better idea of the nature and extent of the undiscovered reserves of petroleum in the United States. The first of these was up-dip wedge belts of porosity in reservoir rocks and the second was geologic strata which are separated by unconformities.

Part 2 said that with still vast quantities of favorable formations, the declining rate of discovery indicated something was seriously wrong with prospecting technique. It declared there was need for creative geology in place of routine geology, with opportunity and encouragement provided for developing new ideas. - Author's abstract, condensed by V. S.

Part 3 outlines some profitable avenues of research. Appropriations should be available for the study of source rocks, the influence of fresh water on oil accumulation, the sedimentational processes and structures, etc. In the present situation the exploratory spirit must not be sacrificed to concern about production. - V. S.

6952. Mining and Metallurgy. Geophysical and Geological Survey of Northern Australia Nears Completion. New York, vol. 23, no. 421, 1942, p. 29.

Reporting the fact that the geophysical and geological survey of Northern Australia has now been in operation for over 6 years and covered some million square miles and has issued some 150 reports. The general operation of the survey is described wherein correlation of geological and geophysical result is brought about by close cooperation of staffs in charge of these two phases of the work of the survey. Other geophysical work of a less long-range variety than that of the survey is carried on by the New South Wales Department of Mines which deals with mining or economic problems of more immediate interest. Other details are given in the article. - D. W., Mines Mag., vol. 33, no. 2, 1943.

6953. Oil and Gas Journal. A.A.P.G. Program Deals with Oil's Part in War. Tulsa, Okla., vol. 40, no. 49, 1942, pp. 23-24.

A brief presentation of the program of the 27th annual meeting of the American Association of Petroleum Geologists, jointly with the society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, Denver, Colo., April 22-24, 1942. - D. W., Mines Mag., vol. 33, no. 4, 1943.

6954. Pirson, S. J. Oil-Supply Problem Demands Early Solution. Oil Weekly, Houston, Tex., vol. 109, no. 3, 1943, pp. 51-56, 76-78.

The current rate of oil discovery by the older methods is low; yet, the demand for oil increases because of war needs. The problem is not only one of visible reserves but also of rate of productivity. Four solutions are examined: Production of synthetic oil from coal and other carbonaceous raw materials, distillation of oil from shales, increased application of secondary methods of oil recovery, and scientifically coordinated wildcatting. The greatest promise lies in the discovery of stratigraphic traps. The present geophysical methods are generally not well-suited for such discovery. Magnetic and gravimetric surveys should help the wildcatters because stratigraphic traps are not devoid of structural relations; also the reflection seismograph may be adapted. However, the greater promise lies in the new geophysical methods, such as the polarization method of Potapenko (see Abs. 101, no. 5576), the conductivity method of Evjen (see Abs. 111, no. 6780), geochemical methods, and electrical prospecting from the surface (without boreholes). The writer considers that a centralized plan and

ntrol of exploration should be adopted by the Government and
kes suggestions. - V. S.

55. Rosaire, E. E. A Prospecting Programme for the Dominion.
Canadian Oil and Gas, Toronto, vol. 3, no. 3, 1941, pp. 3-11.

The history of prospecting for oil is traced from drilling
seeps, through geology and searh for anticlines, subsurface
ological methods, and finally through ordinary geophisical
ocedures. Each in its turn has shown diminishing returns with
me,according to the author. The more recent return to a direct
proach in geochemical prospecting is discussed. A program is
oposed using first all known geology and grid control for soil
alysis to locate significant anomalies. Further detail on
ese would be evaluated by carefully applied seismic reflection
rveys further checked by "slim hole" confirmation. The plan
ggested is admittedly unique and not a "Chinese copy" of
rrent practice in the United States.*** The possibilities of
ch an exploration plan exist in Canada, as is noted, for the
ea has not been worked over as in the United States. In the
ited States new methods were introduced in succession as they
veloped and were recognized. A well-based article with a
reword by the editor pointing the needs and responsibilities
Canada in the war effort. - D. W., Ann. Bibl. Econ. Geol.
41, vol. 14, no. 2, 1942.

56. Rosaire, E. E. Prospecting Strategey in Total War
Economy. Oil Weekly, Houston, Tex., vol. 104, no. 12,
1942, pp. 14-17.

A straightforward article that puts the question: Can we
der stress find oil fields that are strategically located?
e author discusses the many angles of this subject and makes
e main point that prospectors must revise their outlook and
arch for oil rather than structure. The article is illustrated
examples of the inability of many branches of industry to
resee the magnitude of the present crisis and its demands, of
her examples of prophets whose predictions though dire have
me true in military and business affairs, and of a few heart-
ing cases of dynamic action on the part of some manufacturers.
is held that with the proper perspective we can revise our
ospecting tactics and find the necessary oil. - D. W., Mines
g., Denver, Colo., vol. 33, no. 3, 1943.

57. Stormont, D. H. Oil Receives Attention at Scientists
Meeting. Oil and Gas Jour., Tulsa, Okla., vol. 40, no. 35,
1942, p. 19.

Brief remarks on certain papers given at the 110th meeting of the American Association for the Advancement of Science, at Dallas, Tex., in December, 1941. Exploratory methods employed in the oil industry, geology, geophysics, and the uses of certain phases of physics were discussed by various speakers. - D. W., Mines Mag., vol. 33, no. 2, 1943.

6958. Uren, L. C. Recent Developments in Formation Logging: Rate-of-Penetration Logs, Caliper Logs, Temperature Logs, and Logging by Inspection of Drilling Fluid; Part 1. Petrol. Eng., Dallas, Tex., vol. 14, no. 5, 1943, pp. 63-70.

Drilling time indicates the rate of penetration of formations and can be made the basis of a log. Obviously, the rate of penetration depends not only on the lithological character of the formation but also on the design and condition of the bit, the circulation of the drilling fluid, the skill of the driller, etc. But most of these factors tend to become reasonably constant and do not impair the comparability of data. The best results are obtained when the bit pressure is regulated automatically. The author describes several drilling-time recording instruments. Lithologic information on the strata can be also obtained by a record of variations in the diameter of the well. In soft formations the diameter of the well is considerably larger than that of the bit; in hard formations it is but little larger than the bit. The Halliburton Oil Well Cementing Co. has developed a "caliper" instrument that measures the diameter of the hole at all depths. - V. S.

9. NEW PUBLICATIONS

6959. Bersudskii, L. D., Logachev, A. A., and Solodukho, O. Iu. A Textbook on Magnetic Surveying, Moscow, Gostoptekhizdat, L-M, 1940, 288 pp. Price, 12.00 rubles.

This textbook consists of a brief introduction and three parts. The introduction outlines the origin and development of the magnetic survey. Part I gives the physico-mathematical foundations of the survey; considerable attention is devoted to the magnetic properties of different rocks and minerals. Part II describes the apparatus and techniques of magnetic measurements, particularly the apparatus used in the U.S.S.R. Part III treats of the application of magnetic principles to geological surveys, especially to the investigation of iron-ore deposits. - V. S.

900. International Geodetic and Geophysical Union, Washington
meeting. September 4-15, 1939, Transactions, edited by
A.H.R. Goldie, in collaboration with J. W. Joyce. Internat.
Geod. and Geophys. Union Bull. 11, Edinburgh, 1940, 556 pp.
Price, £ 1.50.

This volume contains transactions of the International
ssociation of Terrestrial Magnetism and Electricity, including
he following articles:

Part 1, Agenda and minutes, pp. 1-68.

Part 2, National reports, pp. 69-176: Central America;
enmark - Rapport sur les travaux magnétiques, 1936-39, by
. La Cour; Egypt - Report on Work Done on Terrestrial Magnet-
sm at Helwan Observatory during 1936-39, by L. R. Madwar;
inland - Report on Work in Terrestrial Magnetism and Electric-
ty in 1937-39, by J. Keränen; Report Regarding Research Work
t the Geophysical Observatory at Sodankylä in 1937-39, by
. Sucksdorff; France - Rapport de la Section de Magnétisme
t Électricité Terrestre au Congrès de Washington (1939), by
ouis Eblé; Germany - Deutscher Landesbericht, by J. Bartels;
eophysikalisches Institut, Potsdam, by J. Bartels; Deutsche
eewarte, Hamburg, Gruppe Erdmagnetismus, by F. Spiess;
rdmagnetisches Observatorium, Fürstenfeldbruck (Oberbayern),
y F. Burmeister; Erdmagnetisches Observatorium, Wien-Auhof,
y M. Toperczer; Geophysikalische Warte in Königsberg Pr.,
y H. Lettau; Kommission zur geophysikalischen Reichsaufnahme,
y O. Barsch; Geophysikalisches Observatorium am Collmberg bei
schatz, by L. Weickmann; Oberschlesische wissenschaftliche
andeswarte in Ratibor, by K. [illegible]; Great Britain - Report
f the British National Committee, 1936-39; Holland - Rapport
ur les travaux magnétiques, 1936-39, by C. van Dijk; Hungary -
ericht über das Kön. Ung. meteorologische und erdmagnetische
bservatorium zu Ógyalla, by A. Réthly; Japan - Observations of
errestrial Magnetism, Atmospheric Electricity, and Earth Current
t the Magnetic Observatories in Kakioka and Toyohara, Japan, by
. Okada; Morocco - Rapport sur les travaux de la section de
agnétisme et Électricité Terrestres depuis la Réunion
'Édimbourg de l'U.G.G.I., by J. Debrach; Poland - Travaux de
'Observatoire Géophysique de Świder, by St. Kalinowski; South
frica - Progress of Work in Terrestrial Magnetism, by A. Ogg;
weden - Report on Work in Terrestrial Magnetism and Atmospheric
lectricity Since the Edinburgh Assembly, by Harald Norinder;
pecial Reports, by Hannes Alfvén, F. Lindholm, Gustaf S.
jungdahl, Kurt Molin, H. Norinder, J. [illegible]; Appendix; United
tates - Report of the Section of Terrestrial Magnetism and
lectricity of the American Geophysical Union, 1938-39, by
. W. Joyce; Preliminary Report on Magnetic and Electrical
aboratories in New Geophysics Building, Colorado School of
ines, by C. A. Heiland; Progress of Work in Terrestrial

Magnetism of the United States Coast and Geodetic Survey, July 1, 1936-June 30, 1939, by N. H. Heck; Report by the Department of Terrestrial Magnetism, Carnegie Institution of Washington, to the Washington Assembly on Work Done Since the Edinburgh Assembly, by J. A. Fleming; U.S.S.R. - Report on Work in Terrestrial Magnetism and Electricity during 1936-39, by P. P. Lazarev, N. I. Louschin, N. R. Nikolsky, N. V. Pushkov, and N. N. Trubyatchinsky.

Part 3, Special reports, pp. 177-218: (1) Rapport sur la publication du caractère magnétique de chaque jour, by G. van Dijk; (2) Rapport sur la publication du caractère magnétique numérique des jours, by G. van Dijk; (3) Rapport sur la publication des caractères magnétiques pendant l'année polaire 1932-33, by G. van Dijk; (4) Report on International Magnetic Classification of Greenwich Days Prior to 1906, by G. van Dijk; (5) Bestimmung täglicher internationaler erdmagnetischer Charakterzahlen für Jahre vor 1890, by J. Bartels; (6) Report of Committee to Consider Existing and Desirable Distribution of Magnetic and Electric Observatories and the Better Coordination of Work and Publications of Existing Observatories; (7) Report of the Auroral Committee, by Carl Störmer; Addendum to Report to the Auroral Committee; Appendix, by C. Störmer; (8) Report of Committee for Study of Relations between Solar Activity and Terrestrial Magnetism; (9) Report of Special Committee on Magnetic Secular Variation; Appendices; (10) Report of the Committee for the Electrical Characterization of Days, by O. H. Gish; Appendix; (11) Electric Characterization of Days Used in Connection with Publication of Atmospheric-Electric Data from Watheroo and Huancayo, by J. A. Fleming; (12) Report of the Committee on Magnetic Charts (Organization of the Work), by H. Spencer Jones; (13) Report of the Committee on the Methodology of Magnetic Charts, by J. Keränen; (14) Report of the Committee on Registration in Iceland of Giant Pulsations; Commission relative au mode de publication des observations magnétiques, rapport du président; (15) Report of Committee on Classification of Magnetic Literature, by H. D. Harradon; Appendix: An Extension of the Dewey Decimal Classification for Terrestrial Magnetism, by D. G. Knapp; (16) Report of Committee to Promote International Comparisons of Magnetic Standards, by D. La Cour; (17) Progress Report of the Joint Committee to Describe Magnetic Disturbances, by J. A. Fleming; (18) Joint Committee with International Scientific Radio Union, by E. V. Appleton and L. V. Berkner; (19) Report on Moon's Effect upon Geophysical Phenomena, by S. Chapman; (20) Report on Possible Errors in Connection with the Use of Ion-Counters, by G. R. Wait; (21) Report on the Activity of the Polar Year Commission, by D. La Cour; (22) Report on Photographic Reproduction of Records, by D. La Cour; (23) List of Registerings, Observations, Photographs, and Discussions Regarding Magnetism, Earth-Current, Cosmic Radiation, and Aurora, Collected for the Use of Investigators;

24) Provisional Report of the Statistical Study on the Diurnal ariations of Terrestrial Magnetism in the North Polar Regions, y M. Hasegawa.

Part 4, Communications, pp. 319-531: A. Terrestrial agnetism. (1) The Influence of the Surrounding Air upon the ime of Vibration of a Magnet, by J. Veldkamp; (2) Etude Comarative en divers points du globe de la variation diurne de a declinaison cycle undécennal, by M. et Mme. Labrouste; (3) n Prediction and Mutual Correlation of the Maps of Distribution f Magnetic Elements and Their Annual Changes, by B. P. Weinberg; 4) A Design for a Traveling Electromagnetic Standard, by E. A. ohnson; (5) Measurement of Susceptibility of Materials Used n Magnetometers, by E. A. Johnson & W. F. Steiner; (6) etermination of the Secular Variation in Declination in New ngland from Magnetic Polarization of Glacial Varves, by A. G. cNish and H. F. Johnson; (7) Various Hypotheses Regarding he Origin and Maintenance of the Earth's magnetic field, by . H. Vestine, M. A. Tuve, and E. A. Johnson; (8) The Disurbance-Field of Magnetic Storms, by E. H. Vestine; (9) The otential of the Earth's Magnetic Secular Variation, by E. H. estine; (10) Sur le lien entre les phénomènes solaires et agnétiques, by J. Coulomb; (11) Improvements in Methods of ield-Observations in the United States of America, by J. W. oyce and H. I. McComb; (12) Improvements in Technique at agnetic Observatories in the United States of America, by . E. McComb and J. W. Joyce; (13) International Magnetic lassification for Years Prior to 1890, by G. van Dijk; (14) uroral Work in Southern Norway in the Year 1933, by Carl törmer. B. Ionosphere. Cosmic Radiation. (1) L'étude des vanouissements brusques des ondes radioélectriques courtes, by . Jouaust; (2) Observatory Technique of Ionospheric Measureents, by L. V. Berkner; (3) Ionospheric Effects Associated ith Magnetic Disturbances, by L. V. Berkner, H. W. Wells and . L. Seaton; (4) On the 27-day and 13.5-day Waves in Cosmicay Intensity and Their Relation to Corresponding Waves in errestrial-Magnetic Activity, by S. E. Forbush; (5) Results f Continuous Multifrequency Ionospheric Recordings at the uancayo Magnetic Observatory, Peru, December 1937 to December 938, by H. W. Wells and H. F. Stanton; (6) The Ionospher, by . O. Hulburt; (7) Nonseasonal Behaviour of the F-region, by . L. Seaton and L. V. Berkner; (8) Tables of Sunspot-Frequency or 1749-1938, by W. Brunner. C. Atmospheric and Terrestrial lectricity. (1) Le rôle de la radioactivité dans les roches, y E. Rothé; (2) Mesures comparatives de la conductibilité de l'air, by W. Smosarski; (3) Nouveaux types de compteur d'ions tmosphériques pour la détermination directe du spectre de obilités, by P. Queney; (4) Densities of Condensation-Nuclei ver the North Atlantic Ocean, by F. T. Davies and G. R. Wait; (5) Need for Measurements to Supplement Observations of Potential-Gradient and of Conductivity at Atmospheric-Electric

Observatories, by O. W. Torreson and G. R. Wait; (6) The Application of Telluric Currents to Surface Prospecting, by Marcel Schlumberger; (7) Variation of Earth-Current Activity with the Sunspot-Cycle, by W. J. Rooney. D. Joint Discussions with the Association of Meteorology. (1) Recent Progress in the Investigation of Thunderstorms, by F. J. W. Whipple; (2) Meteorological Aspects of Thunderstorm Electricity, by H. R. Byers; (3) Ionic Equilibrium in the Troposhpere and Lower Stratosphere, by O. H. Gish and K. L. Sherman; (4) Some Meteorological Effects and Their Relation to the Electrical Condition of the Lower Atmosphere, by G. R. Wait and O. W. Torreson; (5) The Electrical and Meteorological Development of Thunderstorms, by E. J. Workman and R. E. Holzer; (6) The Origin and Types of Discharges in Thunderstorms, by R. E. Holzer and E. J. Workman; (7) The Density of the Upper Atmosphere from Photographic Meteors, by Fred L. Whipple; (8) Problems of Upper Atmospheric Physics, by L. V. Berkner; (9) Relation Between Actual and Virtual Ionospheric Height, by H. G. Booker and S. L. Seaton; (10) Some Recent Ionospheric Researches, by E. V. Appleton; (11) Recombination and Attachment Processes in the Ionosphere, by H. S. W. Massey; (12) Dissipative Processes for Electrons in the Ionosphere, by E. V. Appleton; (13) Problems of the Intermediate Atmosphère, by E. O. Hulburt, E. A. Johnson, and M. A. Tuve; (14) Suggested Lines for Further Investigations of Upper-Air Physics, by J. A. Fleming.

Part 5, Proposals on Various Subjects, pp. 532-549; (1) Accurate Determinations of the Magnetic Declination and Inclination, by J. Egedal; (2) Central Bureau for Magnetic Data, Proposal by Professor Errulat; (3) Palaeomagnetic Investigations, by J. A. Fleming, E. A. Johnson, and A. G. McNish; (4) Contribution à la recherche de la variation séculaire du champ magnétique terrestre, by E. Thellier; (5) First Report on Coordinated Study of Volcanic Phenomena at Santa Maria: Initial Geomagnetic Work, by A. G. McNish; (6) First Report on Coordinated Study of Volcanic Phenomena at Santa Maria: Initial Geoelectric Work, by O. H. Gish; (7) A propos de résistivité en prospection électrique: une pratique à rejeter, by P.-L. Mercanton; (8) A Possible Method of Measuring the Effect of Particle Emission on the Earth;s Magnetic Field, by E. A. Johnson; (9) Importance of the Development of New Observational Technique for Land Magnetic Measurements, by E. A. Eckhardt.

Part 6, Resolutions, Committees, and Reporters, pp. 550-558: A. Resolutions of the Association; B. Executive Committee; C. Committees; D. Reporters.

6961. Jakosky, J. J., Dreyer, R. M., and Wilson, C. H. Geophysical Investigations in the Tri-State Zinc and Lead Mining District. University of Kansas Publications, a

Joint Publication of State Geological Survey of Kansas, Bulletin 44, and Engineering Experiment Station, Bulletin 24, December 1942, 151 pp.

A brief review appeared in the Bull. Am. Assoc. Petrol. ol., vol. 27, no. 1, 1943 (see Abs. 112, no. 6823). Jakosky ves a more complete summary in Geophysics, vol. 8, no. 2, 43, pp. 177-178. - V. S.

62. Pollard, Ernest, and Davidson, W. L., Jr. Applied Nuclear Physics, 249 pp., illus., New York, John Wiley and Sons, Inc., London, Chapman and Hall, Ltd., 1942. Price, $3.00.

The geophysicists interested in radioactivity will find in is book the technical aspects of nuclear physics. The author scribes and explains the essential facts and methods of tificial radioactivity and its instrumentation. He aims to be of rvice to technical specialists who, though not versed in e language of physics, use the products of nuclear physics their own fields. The chapters cover Radioactivity, Techque in Artificial Radioactivity, Artificial Radioactivity Practice, Stable Isotopes and their Application, and other pics. The text includes summarized tables on radioactive ements. - V. S.

63. Rosaire, E. E. Handbook of Geochemical Prospecting. Subterrex, Houston, Tex., 1939, 60 pp. Supplements 1-2, 1940, pp. 62-112.

The Subterrex Co. has added two supplements to the Handok proper (see Abs. 104, no. 6704) describing developments geochemical prospecting: (1) Geochemical Well Logging covers dividual logs for hydrogen, total hydrocarbons, methane, gas ydrocarbons (methane through butane), distillate Hydrocarbons pentane through about decane), sand, carbonates, sulfates, nd halides (undifferentiated chlorides, bromides, and iodides); dry-hole technique by the analysis of file samples from andoned wildcat tests is also outlined; and (2) the Geoectrical Recognition of Inorganic Geochemical Anomalies enters about Eltran prospecting for geochemical anomalies, a odification of L. W. Blau's electrical transient method. ltran is based on the physical measurement of the bulk sedientary properties and is suited for rapid, quantitative, lowost reconnaissance. Eltran data clarify reflection problems y differentiating between symmetrical and annular secondary arbonate types of deposition. - V. S.

10. PATENTS

6964. Side Wall Sampler; P. T. Bynum, Beeville, Tex.: U.S. Patent 2,299,076, issued October 20, 1942.

A side-wall sampler including a housing having a body, a trigger carried by the body, a plunger within the body, means normally urging the plunger downwardly within the body, means carried by the plunger and engageable with the trigger for retaining said plunger against the tension of the last-mentioned means, and a sampling tube carried by the plunger and movable laterally upon release of the trigger and consequent downward movement of the plunger and upward rush of fluid in the plunger to engage side wall for a sampling operation. - Claims allowed, 8.

6965. Vibration Measuring Apparatus; C. S. Draper, Newton, Mass., assignor to Research Corporation, New York, N. Y., a corporation of New York: U. S. Patent 2,299,081, issued October 20, 1942.

A means for converting energy of vibratory angular motion about a given axis into electric energy, comprising, in combination, a shaft rigidly connected to the vibrating structure, a balanced mass mounted on bearings coaxially with said shaft and restrained to rotate with the mean angular velocity of said shaft by springs disposed between said mass and said shaft, magnet means secured to said mass having magnet poles symmetrically disposed on either side of the axis of said shaft and mass, an armature of material having a magnetic permeability high compared to that of air secured to said shaft, said armature having a recess, a coil mounted on said armature in said recess and electrically insulated from the armature, said armature and coil being so disposed between poles of said magnet that relative motion between said mass and said armature causes a transfer of flux from a portion of said armature on one side of said recess to a portion on the other side, thereby resulting in a change of flux through said coil and generating an induced voltage substantially proportional to the velocity of relative motion between said mass and said armature, said voltage being therefore substantially proportional to the vibratory angular motion of this shaft above a certain frequency. - Claims allowed, 7.

6966. Explosive Charge for Oil Wells; W. E. Lawson, Woodbury, N. J., and C. A. Woodbury, Media, Pa., assignors to E. I. du Pont de Nemours and Co., Wilmington, Del., a corporation of Delaware: U. S. Patent 2,299,907, issued October 27, 1942.

An explosive charge adapted for use in wells, comprising a water soluble inorganic salt, dispersed in a liquid explosive nitric ester present as a continuous flowable liquid phase, said charge being free from absorbents, the entire composition being in flowable form. - Claims allowed, 13.

6967. Testing Well; J. B. Clark, Tulsa, Okla., Assignor to Stanolind Oil and Gas Company, Tulsa, Okla., a corporation of Delaware: U. S. Patent 2,300,206, issued October 27, 1942.

A method of determining the location of the lowermost point of water entry into a well comprising the steps of displacing the well fluids in said well to a point above said lowermost point by a high resistivity liquid the specific gravity of which exceeds that of the water in said well, and which is substantially immiscible with said well fluids, causing water from a permeable formation to flow into said well whereby an interface is produced in the column of fluid in said well substantially at said boundary, and thereafter determining the location of said interface. - Claims allowed, 15.

6968. Oscillograph; Eberhard Steudel and Josef Kaspar, Berlin, Germany, assignors to General Electric Co., a corporation of New York: U. S. Patent 2,301,826, issued November 10, 1942.

A stereoscopic oscillograph for simultaneously observing four cathoderay-tube image screens upon which separate and different oscillographic traces are produced, including semi-transparent elements for viewing the image screens in pairs, said elements being so arranged that when viewed through each said element the screens of the respective screen pair appear superimposed, and means including light transmitting stereoscopic lenses whereby both screen pairs when viewed through said lenses appear at the same place and whereby the four separate and distinct oscillographic traces will appear as present on a single screen. - Claims allowed, 1.

6969. Accelerometer; J. A. Buchanan, U. S. Navy: U. S. Patent 2,302,670, issued November 24, 1942.

A device adapted for use in ascertaining acceleration imparted thereto, said device including an element movable in response to acceleration comprising a multicompartment shell, each said compartment containing a mass free to move therein to develop internal damping. - Claims allowed, 6.

6970. Gun Perforator; A. J. Holifield, Mobile, Ala., assignor of one-fourth to E. H. Planck, and one-half to M. H. Dees, both of Mobile, Ala.: U. S. Patent 2,304,408, issued December 8, 1942.

A gun perforator comprising a body member having a plurality of cartridge chamber, plunger-operated firing pins associated with the cartridge chambers, means for normally holding the plunger in inoperative position, and hydraulic means adapted to communicate with a drill pipe for moving the plunger to operative position. - Claims allowed, 10.

6971. Timing Device; J. D. Eisler, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware: U. S. Patent 2,304,901, issued December 15, 1942.

In an apparatus for recording timing indications on a photosensitive medium, the improvement which comprises means for directing a beam of light toward said photosensitive medium, a first member mounted to oscillate at a constant frequency, an oscillating light mask associated with said first member and arranged to oscillate about an axis substantially parallel to said beam of light at a constant frequency different than the frequency of said first member, the ratio of said frequencies being a small whole number greater than one, said oscillating light mask and said first member being further arranged such that for small motions of the first oscillating member the path of the portion of the light mask interrupting the light beam is perpendicular to the path of motion of the first oscillating member. - Claims allowed, 8.

6972. Firing Means for Well Perforating Guns; A. J. Collins, Corpus Christi, Tex.: U. S. Patent 2,305,139, issued December 15, 1942.

In a well gun-firing device, the combination of a gun barrel, a support having means for connecting with said gun barrel and provided with a chamber, a primary firing element movably disposed between the gun barrel and the chamber of said support, an actuating member movable in the chamber of said support, means for holding said member elevated above said firing element, means for running said device in a well bore, means set to operate from the top of the well for releasing said holding means and firing said member when said running means is rotated, and means normally under tensioned restraint for impelling said member into firing engagement with said firing element. - Claims allowed, 12.

973. Electrical Terminal; R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Incorporated, Tulsa, Okla., a corporation of Delaware: U. S. Patent 2,305,150, issued December 15, 1942.

An electrical lead-in assembly comprising a body formed
f material having a substantially negligible coefficient of
ermal expansion and, integrally cast therein and extending
erethrough, a continuous electrical conductor of irregular
ongitudinal cross-sectional outline, said conductor having
appreciable thermal expansion coefficient. - Claims allowed,
.

974. Vibration Measuring Apparatus; F. E. Minor, Baltimore, and S. A. Kilpatrick, Raspeburg, Md., assignors to the Glenn L. Martin Co., Baltimore Md.: U. S. Patent 2,305,267, issued December 15, 1942.

A pick-up device for inductively producing electric
rrents in response to accelerations of a vibrating body
mprising three metallic rings coaxially alined and in-
luding a center ring and two outer rings, two spring disks
itially strained in opposite directions and each extending
tween said center ring and an outer ring, a metallic mass
ld by and between said disks, said mass being movable with
spect to said rings, two coils each of which being mounted
an outer ring, and means for holding said rings, mass,
sks, and coils in assembled position. - Claims allowed, 9.

975. Earth Boring Device; A. H. Graham, Dallas, Tex., assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York: U. S. Patent 2,306,118, issued December 22, 1942.

A boring head for earth boring implements comprising a
sing, in said casing a shaft, an auger mounted upon the
wer end of said shaft having a cutting flight extending
xially beyond said casing and having a diameter at least as
eat as the external diameter of said casing, rearward
lights of said auger within said casing being of less di-
meter than the internal diameter of said casing and bearing
eans internal of said casing adjacent its end to cooperate
ith the peripheral edge of said rearward flights to hold
he shaft and auger centered in said casing, and conveyor
lights greater in diameter than said rearward flights and
aving a pitch different from the rearward flights to facilitate
emoval of cuttings produced by the rotation of the auger. -
laims allowed, [illegible].

6976. Measuring and Recording Apparatus; Mayne, W. H., San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex.: U. S. Patent 2,306,456, issued December 29, 1942.

In apparatus for use in seismic surveying in conjunction with at least two seismometers disposed at spaced points, the combination with a pair of thermionic valves, each of said valves having operating characteristics such that the upper portion of the E_g-I_p curve thereof is generally parabolic and being biased for operation substantially at the vertex of said curve, of means for supplying to said valves wave-form energy from said seismometers, and indicating means operable by the output of said valves. - Claims allowed, 6.

6977. Measuring and Recording Apparatus; Mayne, W. H., San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex.: U. S. Patent 2,306,457, issued December 29, 1942.

In apparatus for use in seismic surveying, the combination with a seismometer for converting seismic energy into electrical wave form energy, of means for amplifying and recording said wave form energy, said last named means including a thermionic valve having a cathode, an anode, and at least three grids, means applying a negative bias voltage to the first and third grids and a high voltage to the intermediate grid, means for connecting said anode and cathode, and means delivering a control voltage to one of said negatively biased grids, the applied voltages being such as to cause the anode current-grid voltage relation to vary substantially as a parabola through and beyond the parabolic vertex and to establish the static operating point substantially at the parabolic vertex, whereby the anode current varies as the square of the control voltage, and means for deriving from said anode current an alternating voltage having a frequency twice that of the control voltage. - Claims allowed, 10.

6978. Measuring and Recording Apparatus; Mayne, W. H., San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex.: U. S. Patent 2,306,458, issued December 29, 1942.

In apparatus for use in seismic surveying, the combination with a seismometer for converting seismic energy into electrical wave form energy, of means for amplifying and recording said wave form energy, said recording means including an energy squaring device, said device including a recording oscillograph of the electro-dynamometer type having fixed and movable coils, and means energizing both of said coils with said wave form energy. - Claims allowed, 1.

979. Automatic Volume Control; G. M. Groenendyke, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York: U. S. Patent 2,306,991, issued December 29, 1942.

In an electric seismograph comprising means for detecting eismic waves by generating electrical signals in sympathy ith them, thermionic means for amplifying said electrical ignals, means for recording the amplified signals on a standard idth strip in the form of a seismogram, an automatic volume ontrol for said amplifier whose operation is initiated by the lectrical signals, said automatic volume control comprising ommon thermionic means for both amplifying and rectifying he electrical signals, a resistance in the plate circuit of aid thermionic means, energy storage means connected in arallel with said resistance whereby the IR drop across said esistance will serve as a charging voltage for said energy-torage means, a second energy-storage means connected in uch relation to said first-energy storage means that it will ot receive any substantial energy until the first storage eans has become substantially fully charged, and means for ommunicating the charged potential of the second-energy torage means to the control grid of at least one vacuum tube n the thermionic amplifier to effect control of the gain in mplification as derived from that tube. - Claims allowed, 2.

980. Seismic Exploration System; Herbert Hoover, Jr., Sierra Madre, Calif., assignor to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California: U. S. Patent 2,307,791, issued January 12, 1943.

In a seismic prospecting system for measuring relative imes of seismic wave arrival at spaced points, including a lurality of seismic wave receptors in contact with the ground t varying distances from a source of seismic waves, a plu-ality of substantially identical amplifiers having their in-uts connected to different receptors, a trace recorder onnected to the output of each amplifier and recording the aves received at said receptors as traces having a common ime coordinate, the combination which comprises a single ommon voltage source connected to similar elements of each mplifier, each of the connections from the voltage source o the respective elements including means to attenuate waves ithin the frequency range of waves to be amplified by the espective amplifiers and recorded as related traces to be irectly compared, whereby undesired crossfeed between ampli-iers through the common voltage source and timing errors rising from such crossfeed are prevented. - Claims allowed, 2.

6981. Seismometer; Herbert Hoover, Jr., Sierra Madre, Calif., assignor to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California: U. S. Patent 2,307,792, issued January 12, 1943.

Apparatus for seismic surveying comprising a seismometer having opposite ground contact surfaces of differing contour and having substantially equal sensitivity in either of two opposite planting orientations assumed by said seismometer when one of said surfaces is in contact with the ground and beneath the other, a seismic wave amplifier connected to said seismometer, a reproducer connected to the output of said amplifier, and means for inverting the sense of signals passing through said connections in accordance with seismometer orientation to provide the same sense relationship of the reproduced wave to the received earth motion irrespective of the seismometer planting orientation in use at the time of the wave reception. - Claims allowed, 4.

6982. Gravity Meter; D. H. Clewell, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York: U. S. Patent 2,307,917, issued January 12, 1943.

An instrument for geophysical prospecting that provides means for measuring the force of gravity or variations of the force of gravity over a given area, that comprises a support, a pair of masses, resilient means for securing the masses to opposite sides of the support so that the masses are held in equilibrium with the force of gravity and are free to move about the equilibrium point in short, slightly convergent, substantially vertical paths, a substantially horizontal tension member connected to the two masses and attracting one toward the other with a force sufficient to introduce a negative stiffness factor that nearly cancels the positive stiffness of said resilient means and thereby introduces a high sensitivity of the system to changes in the force of gravity, and means indicative of position of at least one of the masses. - Claims allowed, 5.

6983. Operations in Boreholes; L. G. Howell, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware: U. S. Patent 2,308,176, issued January 12, 1943.

In an operation conducted in a borehole in which at least two extraneous materials are placed in the borehole and it is desired to determine the position which such materials assume in the borehole, the steps of adding to each such material before introducing it into the borehole a radioactive material of relatively short life, the life of said radioactive material being different for each such extraneous material, placing said materials in the borehole, producing a radioactive well log of said borehole during the life of the shortest lived radioactive material, and producing a second radioactive log of said borehole after the termination of the life of the shortest lived radioactive material whereby the location of the extraneous material containing the shortest lived radioactive material can be determined by comparison of said logs. - Claims allowed, 2.

6984. Well Logging Method and Device; R. E. Fearon, Tulsa, Okla., assignor, by mesne assignments, to Well Surveys, Inc.: U. S. Patent 2,308,361, issued January 12, 1943.

The method of determining the nature of formations penetrated by a drill hole which comprises inserting in the drill hole a neutron-emitting source and measuring the radiations from the formations as influenced by said neutron-emitting source, by impressing an electrical potential on an ionizable medium of relatively high density and exposing said ionizable medium to the radiations intercepting said drill hole whereby ionization of said ionizable medium is caused and electrical current permitted to flow and measuring the magnitude of the current. - Claims allowed, [illegible].

6985. Apparatus for Detecting and Exhibiting Explosions in Wells; [illegible], Aspinwall, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware: U. S. Patent 2,30[illegible], issued January 12, 1943.

An apparatus for exhibiting occurrence of explosions created in a bore, in regions subject to extraneous vibrations comprising, in combination with a seismic wave detector, means including an adjustable-gain amplifier for exhibiting the magnitude of extraneous terrestrial vibrations, a critical-level trip circuit energized by said amplifier in response to terrestrial vibrations above a selected level, energy exhibiting means in said trip circuit, and means for adjusting the critical energy level of the exhibiting means. - Claims allowed, 3.

6986. Well Logging Winch Truck; [illegible] H. Olmstead, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla. a corporation of Delaware: U. S. Patent 2,308,004, issued January 12, 1943.

In a winch truck of the type employed in oil well logging for receiving the electrical cable used in suspending the logging instrument including a chassis mounted on wheels connected through a drive shaft with a prime mover, the improvements which comprise a cable receiving winch transversely mounted adjacent the rear of the chassis, a cable-guiding traversing means mounted near and cooperating with the winch for facilitating uniform distribution of cable during winding upon the winch, a smoothly continuously variable fluid-power transmitting means coupling the winch to the prime mover, said means comprising a hydraulic motor connected to the winch for driving the same, a variable stroke pump driven by the prime mover for operating the motor whereby alteration of the pump stroke causes change in the rate of operation of the motor, and a remote control for altering the stroke of said pump whereby the rate of operation of the motor can be adjusted from a location distant from the truck. - Claims allowed, 1.

6987. Method of Making Geophysical Explorations; L. F. Athy, Ponca City, Okla., and H. V. McCollum, Houston, Tex., assignors to Continental Oil Co., Ponca City, Okla., a corporation of Delaware: U. S. Patent 2,309,317, issued February 2, 1943.

A method of profiling tectonic structure including the steps of generating seismic waves at a point near the earth's surface, recording the time of travel of reflected waves from the generating point to the reflecting horizon and back to a plurality of points on the surface located at a predetermined distance from the generating point, computing the velocity of travel vertically to the greatest depth of the reflected seismic waves from the recorded data at the plurality of receiving points. - Claims allowed, 7.

6988. Well Logging Apparatus and Method thereof; R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware; U. S. Patent 2,309,556, issued February 2, 1943.

A geophysical prospecting device that comprises a radiation detector, a well casing perforator and an electrical circuit including both the detector and the perforator capable of simultaneously receiving signals from the former and operating the latter by means of electrical currents having different operating characteristics. - Claims allowed, 11.

89. Geochemical Prospecting; Leo Horvitz, Houston, Tex., assignor to Esme E. Rosaire, Houston, Tex.: U. S. Patent 2,310,291, issued February 9, 1943.

The method of geochemical prospecting for deposits the akage components of which are of a reducing nature comprising llecting earth samples at spaced points in a region to be plored, analyzing such samples for those ions of a polyvalent ement the -ic oxide of which is reducible by hydrocarbon ses present in lower states of valence, and correlating the lue determined with sample locations, whereby information dicative of the presence of such deposits is obtained. - aims allowed, 14.

90. Geochemical Prospecting; E. E. Rosaire, Houston, Tex.: U. S. Patent 2,310,318, issued February 9, 1943.

In geochemical prospecting in which samples of soil are llected for the purpose of recovering therefrom a gas to be alyzed for significant constituents the step of subjecting e soil samples immediately upon recovery to such substantiall duced temperature that such constituents as are otherwise bject to loss at ordinary temperatures are retained in the mples and holding the samples at this reduced temperature til they are subjected to a treatment for the recovery thereom of the gas to be analyzed. - Claims allowed, 3.

91. Electrical Exploration of Geological Strata; F. E. Blondeau, Tulsa, Okla., assignor to Geophysical Research Corporation, New York, a corporation of New Jersey: U. S. Patent 2,310,6[illegible], issued February 9, 1943.

In exploration of geological formations traversed by a rehole of the type bored by a drill stem terminating in a t, the method of electrical exploration which comprises tablishing a difference of electrical potential between said t and said drill stem, and observing the potential produced the earth's surface between two spaced grounded electrodes, least one of which is remote from said drill stem, and serving said potential difference. - Claims allowed, 9.

92. Analysis of Soil Samples for Determination of Oil Content; J. C. Campbell, Houston, Tex., assignor to R. [illegible] Fash, trustee, Fort Worth, Tex.: U. S. Patent [illegible], issued February 16, 1943.

A method for use in exploring for petroleum oil, which nsists in preparing an extract by treating an earth sample with an oil solvent to extract from said sample any petroleum oil contained therein, subjecting the extract to ultraviolet light to produce a fluorescent effect of an intensity proportional to the amount of oil contained in the extract, measuring the intensity of said fluorescent effect to obtain a quantitative determination of the amount of oil in the earth sample, and in adjusting the result thus obtained as to oil content to express the result as an amount of oil per unit area, to thereby compensate for variations in the surface area of the earth particles comprising the sample. - Claims allowed, 9.

6993. Thermometric Method and Apparatus for Exploration of Boreholes: J. J. Jakosky, Los Angeles, Calif., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware: U. S. Patent 2,311,757, issued February 23, 1943.

The method of determining the geologic nature and characteristics of a geologic formation traversed by a borehole, which comprises: moving a source of heat longitudinally through the borehole to supply heat at successively different depths therein, and successively obtaining indications of the difference in temperature between an unheated portion of the borehole located at a fixed longitudinal distance in advance of said heat source, said distance being such that the temperature of said unheated portion is not influenced appreciably by the heat supplied by said heat source, and a heated portion of the borehole located a fixed longitudinally distance behind said heat source, whereby the geologic nature and characteristics of the geologic formation traversed by the borehole may be determined from the data so obtained. - Claims allowed, 4.

6994. Method of Locating Subterranean Petroleum Deposits: R. O. Smith, Fort Worth, Tex.: U. S. Patent 2,312,271, issued February 23, 1943.

In the art of exploration for underground hydrocarbon deposits, the steps which comprise systematically collecting a series of samples of surface soil at spaced locations, extracting said samples separately with an organic solvent for solid, petroleum-derived constituents present initially in said samples in soluble form, and measuring the relative amounts of said constituents thus extracted whereby said underground hydrocarbon deposits can be located. - Claims allowed, 2.

95. Seismic Exploration Method; A. J. Herzenberg, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware: U. S. Patent 2,312,[illegible], issued March 2, 1943.

In a seismograph system comprising a plurality of detectors
apted to generate electric impulses and a multistring recorder
dapted to record said impulses, a plurality of closed circuits
or the transmission of said impulses from the detector to the
ecorder, each of said circuits comprising an input transformer
nductively linking said circuit to a detector and an output
ransformer inductively linking said circuit to one of the
trings of the recorder, a nonlinear resistance element shunting
aid circuit between said transformers, means in circuit with
t least one detector to produce a direct current varying as
function of the amplitude of the impulses generated by said
etector, and single control means for passing said variable
irect current through said nonlinear resistance elements in
eries, whereby the energy of the impulses transmitted in each
said circuits from the input transformer to the output
ansformer is varied as a function of the intensity of said
rect current. - Claims allowed, 6.

96. Gain Control for Seismograph Amplifiers; F. M. Shook, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York: U. S. Patent 2,312,934, issued March 2, 1943.

In a seismograph circuit comprising a seismometer, an
ectrical amplifier and a recorder, the improvement that com-
ises a control circuit for controlling the degree of ampli-
cation of the amplifier, said control circuit including: a
imary control circuit for the amplifier adapted to normally
intain the amplifier at a relatively high degree of amplifica-
on, said primary control circuit being a means for maintaining
bias on the grid of at least one thermionic tube in the ampli-
er; a secondary control circuit including a source of po-
ntial, a condenser, a means for applying said potential
rough said condenser across a resistance in said primary
ntrol circuit in such a manner that the secondary control
rcuit, if acting alone, would instantaneously cause the
imary control circuit to reduce the degree of amplification
the amplifier to a relatively low degree and gradually allow
e primary control circuit to return the amplifier to its
rmal high degree of amplification; and a third control circuit
cluding a condenser and a resistor connected in series across
e condenser in the secondary control circuit and the resist-
ce in the primary control circuit so as to delay the appli-
tion of potential across said first mentioned condenser and
sistance and thus delay the reduction in amplification and
use it to take place gradually. - Claims allowed, 1.

6997. Seismic Recording; D. S. Renner, Dallas, Tex., assignor to Geophysical Service Inc., a corporation of Delaware: U. S. Patent 2,313,091, issued March 9, 1943.

In the art of seismic prospecting the method comprising the steps of creating elastic waves in the earth, recording the instant of creation of the waves and the waves transmitted through the earth to a point in spaced relation with the wave source, and simultaneously recording a numerical chart of time of the seismic event such chart having a predetermined relation with a definite phase of the event. - Claims allowed, 8.

6998. Well-Bore Radiation Logging Apparatus; J. C. Arnold, Los Angeles, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware: U. S. Patent 2,313,310, issued March 9, 1943.

A well logging apparatus comprising: a device sensitive to sub-atomic bombardment from the formation confronting the wellbore, said device including an element adapted to move in response to such bombardment; a recording camera having a predetermined exposure time interval and located in close proximity to said device and element for photographing the movement of said element; and means for correlating the record of said camera in terms of well depth. - Claims allowed, 19.

6999. Means for Determining the Tectonics and Nature of Subsurface Geology; R. E. Lee, Coleman, Tex., assignor, by mesne assignments, to J. H. Reynolds: U. S. Patent 2,313,384, issued March 9, 1943.

An apparatus for geophysical exploration including a housing adapted to be connected in a drill stem, means carried by the housing for setting up an electrical field within the media surrounding said housing, a receiver at the surface, and means mounted on the housing effected by the electrical field and connected with the receiver for indicating the physical distortion of the electrical field pattern as caused by the nature and characteristics of the formation. - Claims allowed, 5.

7000. Method for Making Geophysical Surveys; S. R. Phelan, Memphis, Tenn.: U. S. Patent 2,314,597, issued March 23, 1943.

A method of geophysically exploring subsurface earth structures, which includes establishing three widely spaced electrodes and a source of current; connecting a pair of said lectrodes, to one pole of said source, and one said electrode, paced from said pair, to the other pole of said source to ause current flow and set up a jointly induced group of qu potential surfaces around and spaced from said pair of lectrodes, thereby creating along the surface of the earth survey field spaced as a belt from and around said pair of lectrodes, said field embracing the traces of said jointly nduced equipotential surfaces; and making pick-up observations t spotted points in said field, to obtain desired data. - laims allowed, 19.

001. Apparatus for Making Geophysical Explorations; H. M. Evjen, Houston, Tex., assignor to Nordel Corporation, Houston, Tex., a corporation of Delaware: U. S. Patent 2,314,876, issued March 30, 1943.

A system for electrical prospecting, comprising an earth urrent circuit including a source of direct current, a pair f spaced earth electrodes, and reversing means connected etween said source and said electrodes for reversing the rect current at a predetermined controlled frequency whereby n earth current having a predetermined frequency is passed hrough the earth between said electrodes, a potential circuit ncluding potential pick-up electrodes located at spaced points djacent the earth's surface lying within the field of influence f said earth current, a direct current indicating device conected to indicate the potential of said potential circuit, and eversing means synchronized with said first reversing means nd connected between said potential pick-up electrodes and aid indicating device to convert the pick-up potential differnce into a unidirectional potential suited to actuate said ndicating device, and coupling means connected between said arth current circuit and said potential circuit to impress on aid potential circuit a balancing potential which is directly roportional to the current flowing in said earth current ircuit at the instant of measurement, said coupling means omprising a resistance connected in series with said earth urrent circuit to develop a potential drop thereacross proortional to the current flowing in said earth current circuit, potentiometer connected in said potential circuit to apply hereto a potential drop opposing the potential picked up rom said potential pick-up electrodes, a condenser connected cross said potentiometer, a second condenser, and synchronized witch means connected to alternately connect said second ondenser across said resistance and across said first conenser, whereby said second condenser periodically receives a harge from the potential drop across said resistance and pplies the same to said first condenser for thereby building p a charge in said first condenser which is proportional to he potential drop across said resistance. - Claims allowed,

7002. Magnetic Field Well Logger; Standard Oil Development Co., Linden, N. J., a corporation of Delaware: British Patent 544,676, issued April 23, 1942.

Apparatus for logging the variations of a magnetic field e.g. in a borehole comprising in combination, an indicator adapted to have electric currents induced therein when disposed in a magnetic field, means for moving said inductor over the path to be logged through said magnetic field, and means for collecting and measuring the current induced in said inductor by said magnetic field. - Claims allowed, 7.

7003: Method and Apparatus for Surveying Wells: Mellorsh-Jackson, Leonard, of the firm of Haseltine, Lake & Co., chartered patent agents, London: British Patent 546,055, issued July 23, 1942.

A well-surveying instrument comprising a casing and a pendulum within the casing, characterised by the presence in the casing of a record member adapted to be marked by the passage of a current, and means for providing a continuous current flow throughout a prolonged period between the pendulum and record member to mark the latter. - Claims allowed, 11.

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DECEMBER 1943

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 114

JULY - SEPTEMBER 1943

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

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NITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 114
JULY - SEPTEMBER 1943[1/]

Compiled by W. Ayvazoglou[2/] and V. Skitsky[2/]

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FOREWORD

Geophysical Abstracts 1 - 86 were issued in mimeographed form by le Bureau of Mines; Abstracts 87 - 111 were published in bulletins of the eological Survey. Abstracts 112 and 113 were issued in mimeographed rm by the Bureau of Mines as Information Circulars 7256 and 7257.

1. GRAVITATIONAL METHODS

004. Campbell, R. B. Florida's Geological Structure and Gravity. Proc. Florida Acad. Sciences for 1940, Gainesville, Fla., vol. 5, 1941, pp. 73-84.

/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7267."

/ Senior translator, Bureau of Mines.

Peninsular Florida is anticlinal, and west Florida has a regional dip south-southwest. If the relationships believed to exist between structure and gravity were true, the gravity values should diminish coastward. However, actually they only do so as far as the coastline, where they suddenly increase. This peculiarity seems to occur at all points on both the Atlantic and Gulf coasts. The author studies its possible reasons. A table is given of the data on free air, Bouguer, and isostatic anomalies for various profiles. These data are analyzed, together with similar phenomena in New Jersey, Virginia, and California-Nevada. The explanations of sedimentary load, decrease of acid rocks, and superficial structure are rejected as conflicting with the profiles. A possible explanation may be that the pre-Cambrian basement of Florida is composed of rocks of different densities arranged more or less linearly, with those of greater density near the shoreline. This explanation seems to be supported by the profiles, but the evidence is meager. - V. S.

7005. Elkins, T. A. Nomograms for Computing Tidal Gravity, Geophysics, Menasha, Wis., vol. 8, No. 2, 1943, pp. 134-145.

It is possible, by the use of a nomogram devised by Dr. James B. Friauf (Jour. Franklin Inst., vol. 232, 1941, pp. 151-174) for the solution of spherical triangles, to make simple nomograms for the computation of tidal gravity. Two types of such nomograms are explained and illustrated. The first is for computations at a fixed latitude of the earth; the second is for computations at a fixed point. With the second type the computation of tidal gravity is reduced to a simple routine matter, especially if The American Air Almanac is used as the source of the astronomical data needed. The accuracy of these nomograms is studied and comparison is made of this new method with that recently devised by Dr. Adler (Geophysics, vol. 7, 1942, pp. 35-44). - Author's abstract.

7006. Hammer, Sigmund, and Heck, E. T. A Gravity-Profile Across the Appalachians, Buckhannon, W. Va., to Swift Run Gap, Va. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 353-362.

A gravimetric profile has been surveyed from Buckhannon, W. Va. to Swift Run Gap, Va., through the entire folded sedimentary section of the central Appalachians. 101 gravimeter stations were used over a distance of about 150 miles by road. The gravity observations were made with a standard Gulf gravimeter, according to a "loop" scheme of subbases and intermediate stations. The stations were reduced by E. C. Bullard's modifications of the Coast and Geodetic Survey method; a novel interpolation

echnique was developed for terrain corrections. The results confirmed
revious observations by Nettleton, Thom, Woollard, and others that a
lose conformity exists between gravity trends and topographic trends in
he Appalachian area. The almost complete absence of gravity-expansion
f the Paleozoic and possibly pre-Cambrian rocks tends to indicate that
he major source of the Appalachian gravity features must be sought in
he deep basement rocks. - V. S.

007. Heiland, C. A. A Rapid Method for Measuring the Profile Components of Horizontal and Vertical Gravity Gradients. Geophysics, Menasha, Wis., vol. 8, No. 2, 1943, pp. 119-133.

The trend in gravity exploration in the past years indicates the rather
emarkable fact that a method of low resolving power (the gravity meter)
as replaced one of higher resolving power (the torsion balance). This is
ntirely due to the superior speed of the former and suggests an instrument
nd procedure in which observation time is reduced by (1) reduction in
umber of quantities measured; (2) use of a reference direction near that
f the maximum effect; (3) elimination of the torsionless position as un-
nown; (4) reduction in period, with compensating increase in optical sensi-
ivity; (5) stabilization of termal conditions. These objectives are attained
y (1) measuring the profile components of gradients and curvature values,
referably at right angles to the assumed strike; whereby, for an ideal two-
imensional feature, also the vertical gravity gradient is obtained, and the
ertical and horizontal gravity components may be calculated by integration;
2) by holding the torsionless position constant with temperature control;
3) by decreasing the period and observation time to 3-4 minutes, and (4) by
sing a beam arrangement which will give the gradient in only one azimuth
f desired. Latitude and terrain corrections are also somewhat simplified
y the proposed procedure. - Author's abstract.

008. Hersey, J. B. Gravity and Magnetic Studies Along the Paleozoic-Triassic Contact in Eastern Pennsylvania. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 350-353.

Gravity and magnetic surveys were made in the area between the
elaware River, Emmaus, and Quakertown, Pa., by means of the Humble
ravimeter and Askania vertical magnetometer. The object was to study
e nature of the contact between the pre-Cambrian and Paleozoic and the
riassic sediments and to outline the traprock intrusives in the Triassic.
nly preliminary results are available. 120 gravity stations were used;
he gravity values were reduced for latitude, elevation, and Bouguer-effects,

and a contour map was prepared on the basis of Bouguer anomalies. The results showed a distinct relation between anomalies and areas of traprock. The magnetic surveys were made with Schmidt vertical balances. The first survey showed that the main disturbing factor in Triassic areas is the traprock and that there is an abrupt magnetic difference in going from the Triassic or from Paleozoic limestone to the pre-Cambrian areas. The second magnetic survey mapped the edges of trap bodies near the Triassic-Paleozoic contact. A pronounced magnetic "high" was found over the trapside of the contact zone, and a "low" over the sediment side, so that the contact should be placed between the "low" and the "high". - V. S.

7009. Jeffreys, Harold. The Determination of the Earth's Gravitational Field (Second Paper). Monthly Notices, Royal Astronom. Soc., Geophys. Suppl., London, vol. 5, No. 3, 1943, pp. 55-66.

The data used in a recent paper (see Abs. 106, No. 6131) on the same subject have been rediscussed by a more sensitive method for detecting variations of gravity capable of being represented by spherical harmonics of low degrees. In the first place all cross (nondiagonal) terms in the normal equations for the coefficients were neglected; in the second approximation the terms most strongly suggested by the first approximation were determined by the method of least squares. One second harmonic and three third harmonics, besides the terms included in the usual formulae, were found to be determinable. The variation shows no relation to the elevation of the surface and is inconsistent with accurate compensation. A new determination of the constant and the main ellipticity terms is made incidentally. No fourth harmonics are determinable on the data, but a suggestion is offered for the treatment of an independent term in P_4 if occasion should arise. - Author's abstract.

7010. Klaus, H. Faulting in the Billings Field, Oklahoma, as Interpreted from Torsion Balance Data and from Subsequent Drilling (Abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 325.

The results of an experimental torsion-balance survey of the Billings oil field are shown by means of the conventional maps and second-derivative contour maps. The latter show good, consistent anomalies interpreted as faulting. The survey was made in July 1937, some time after discovery of Ordovician production in the field but long before faulting was established by drilling, and the results of the surveys were communicated to several oil companies interested in the area or in the method of analysis. Meanwhile, faulting has been established by drilling, and the present subsurface interpretations are compared with the original torsion-balance predictions with spect to such faulting. From the amount of agreement between the two ts of data, it is concluded that the torsion balance may still be used ectively for specialized purposes, particularly the investigation of ulting.

11. Legge, J. A., Jr. Determination of the Elevation Factor by the Method of Least Squares (Abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 328.

A method is presented whereby the elevation factor based on the uguer equation may be determined by the method of least squares. The thod may be applied to stations along a straight line or those distributed phazardly over an area.

12. Milcoveanu, Dan. Calcul du gradient pour un cylindre d'axe vertical (Calculation of the Gradient for a Cylinder with Vertical Axis). Bull. Acad. Roumaine, București, vol. 22, No. 7, 1940, pp. 318-328.

Derivation of the horizontal gravity gradient for a vertically infinite inder. The integration leads to spherical harmonics, and a solution is ven in form of a binomial series. - C. A. H., Annotated Bibliography of onomic Geology, vol. 14, No. 1, 1942, p. 125.

13. Skeels, D. C. Gravity Anomalies in Sedimentary Basins. Trans. New York Acad. Sciences, ser. 2, vol. 5, No. 5, 1943, pp. 87-91.

The writer analyzes the bearing of geodetic pendulum data on the ocess of basin development. The data cover the Black Hills-Bighorn-artooth profile; Ardmore Basin, southern Oklahoma; Po Basin, northern ly; Carpathian foreland, Poland; and Caucasus region and Kouznetsk l basin, U.S.S.R. This evidence does not support the isostatic view that weight of the sediments causes sinking of the floor of basins. The uguer anomalies are offered as principal examples. According to iso-tic theory, high areas should have negative Bouguer anomalies; low eas, positive anomalies. But the deep sedimentary basins constitute a markable exception. They are not compensated at depth and are actually t of isostatic balance. On the other hand, the theory of crustal downarp ves a good explanation of these observations. It holds that there must have en some deficiency of mass throughout the period of deposition, so that the nking took place not because of, but rather in spite of isostasy. The author ncludes that there is need for a revision of ideas regarding isostasy and strength of the earth's crust. - V. S.

7014. Woollard, G. P. Geologic Correlation of Areal Gravitational and Magnetic Studies in New Jersey and Vicinity. Bull. Geolog. Soc. America, Washington, D. C., vol. 54, No. 6, 1943, pp. 791-818.

An abstract of this article appeared in the same journal, vol. 52, No. 12, 1941 (see Abs. 108, No. 6380).

2. MAGNETIC METHODS

7015. Fleming, J. A., and Scott, W. E. List of Geomagnetic Observatories and Thesaurus of Values. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 48, No. 2, 1943, pp. 97-108.

Since 1930 the International Association of Terrestrial Magnetism and Electricity has taken steps to publish a complete list of all fixed magnetic and electric observatories, with statements of geographical coordinates, elevations, instrumental equipment, data published regularly, etc., as well as a thesaurus of magnetic values. Because of the uncertainties of the war, it has now been decided to issue several sections of this list in a preliminary form. The present article contains Table I, "Annual Values of Geomagnetic Elements at Observatories". The table covers: (1) Name of observatory, (2) latitude, (3) longitude, (4) year, (5) declination D, (6) inclination I, and (7) components of intensity: horizontal H, North X, East Y, vertical Z, total F. The succeeding parts of this table will be published in forthcoming numbers of the same journal. - V. S.

7016. Fleming, J. A. Researches in Terrestrial Magnetism and Electricity at Department of Terrestrial Magnetism, Carnegie Institution of Washington, for the Year April 1941 to March 1942. Nat. Research Council, Am. Geophys. Union, Trans. of 1942, part II, Washington, D. C., 1942, pp. 312-315.

The researches in terrestrial magnetism and electricity are described under five headings: (1) Geomagnetic investigations - annual variation of geomagnetism at Polar Year stations, occurrence of geomagnetic bays; construction of isomagnetic charts. (2) Observatory work at Húancayo and Watheroo - regular geophysical work, cooperation with other observatories; establishment of an observatory at College, Alaska. (3) Survey work - data on secular variation and new distribution; reduction of magnetic and auroral data of the U. S. Antarctic Expedition. (4) Geoelectrical investigations - nuclei of condensation from various sources; behavior of the Aitken nuclei-counter; comparison of simultaneous atmospheric-electric data over the ocean and at a land-station. (5) Ionospheric investigations - observation of e ionosphere at Huancayo and at Watheroo, a detailed analysis of electri-cation of the outer atmosphere. - V. S.

17. Galbraith, F. The Magnetometer: Its Use as a Geological Instrument. Min. & Indust. Mag. Southern Africa, Johannesburg, vol. 31, No. 1, 1943, pp. 19-23.

This article has previously appeared in Am. Inst. Min. and Met. Eng. ech. Pub. 1482, 6 pp., New York, 1942 (see Abs. 110, No. 6599). - V. S.

Hersey, J. B. Gravity and Magnetic Studies Along the Paleozoic-Triassic Contact in Eastern Pennsylvania. See Geophys. Abs. 7008.

18. Howe, H. H. Recent Alterations in Geomagnetic Secular Variation in Eastern North America. Nat. Research Council, Am. Geophys. Union, Trans. of 1942, part II, Washington, D. C., 1942, pp. 292-294.

About the year 1933 there was an alteration in the rate of change of agnetic declination (D) in the eastern part of the United States. In 1941 e author also noted an alteration in the rate of change of the horizontal tensity (H). It thus became desirable to devise a single graphical repre- ntation of the combined change of D and H. Varying distance and direction mposing secular change can be shown by plotting the vector difference tween consecutive points, drawn from a common origin. Each vector of ch a graph represents the horizontal projection of the field, to be added the mean field for one year to obtain the mean field for the next year. figure in the text shows such horizontal projection of termini of ctor differences of mean fields for consecutive years. - V. S.

19. Johnston, H. F. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for January to March, 1943. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, vol. 48, No. 2, 1943, pp. 93-96.

Tables are given. - V. S.

20. Kalashnikov, A. G. An Experimental Method for the Graphic Construction of the Magnetic Fields of Bodies of All Shapes (Method of the Coordinate Fieldmeter). (In Russian.) Doklady (Trans.) Acad. Sciences U.S.S.R., Moscow, new ser., vol. 32, No. 1, 1941, pp. 47-49.

The theoretical problem of the magnetic field of variously shaped magnetized bodies has not been so far solved in its general form. The author has investigated this problem experimentally for several specific cases found in geophysical practice. He has utilized the principle of a metal contour revolving with constant velocity, for which the current is proportional to the intensity of the magnetic field. An apparatus was devised for applying this principle. It contains a small coil rotating with constant velocity and movable along three coordinate axes into any position in space. By means of this coil, the intensity of a magnetic field can be measured at any point in terms of its three vectors, and an intensity profile can be constructed for any vector. It thus becomes possible to measure the distribution of intensity in the magnetic field of a body of a given shape. Inversely, it may be possible to determine the shape of a body, such as a subterranean formation, by the distribution of intensity in its magnetic field. - V. S.

7021. Knapp, D. G., and Howe, H. H. Magnetic Observatory Results at Sitka, Alaska, for 1933-34. U. S. Coast and Geod. Survey, Washington, D. C., MO-13, 1942, 118 pp.

Tables with text are given covering instruments, constants of the magnetograph, absolute observations vs. base-line values, and the explanation of results. - V. S.

7022. Lasareff, P. P. Études des variations séculaires du magnétisme terrestre. I. Variations séculaires déduites de la théorie de Biot. (Studies of Secular Variations of Terrestrial Magnetism. I. Secular Variations Deduced from the Theory of Biot.) Comptes rendus (Doklady) Acad. Sciences U.R.S.S., Moscow, new ser., vol. 25, No. 1, 1939, pp. 26-29.

A mathematical discussion is given of secular geomagnetic variations. Biot's distribution of geomagnetism serves as the basis of calculations. It is assumed that secular variations are produced by a uniform rotation of the dipole of Biot and that the axis of this dipole always passes through the center of the globe, tracing by its motion a circular cone. The treatment is trigonometrical. Theoretical formulas are at first evolved for the vertical and the horizontal components and the declination of the force of terrestrial magnetism, for every point of the earth's surface and for every epoch. Then two particular instances are studied on further assumptions, in greater detail: (1) Secular variations at the geographical equator; and (2) secular variations at the geographical pole. - V. S.

23. McComb, H. E. Geomagnetic Observatories and Instruments. Proc. Am. Phil. Soc., Philadelphia, vol. 84, No. 2, 1941, pp. 239-255.

Development of magnetic observatories and observatory instruments. f interest are illustrations of the La Cour quartz horizontal and vertical agnetometers. - C. A. H., Annotated Bibliography of Economic Geology, l. 14, No. 1, 1942, p. 127.

24. McNish, A. G. Fossil Magnetism. Sci. American, New York, vol. 99, April, 1943, pp. 166-167.

The direction of the magnetic force is known to change with time at fferent places on the earth's surface. The changes observed have been large as 35° in the direction of the horizontal component in 200 years. e author investigated these changes by examining the magnetization of e varved Pleistocene clays. Embedded in these clays are minute partiles of magnetite. These particles had alined themselves with the magtic field at the time of their deposition and were then locked in place by bsequent layers of clay. A study of their direction leads to the conclusion at the changes through the geologic ages have not differed markedly in agnitude and rate from those during historic times. Moreover, Fisk has monstrated that secular changes are essentially regional. On the basis the total evidence magneticians postulate schematically: (1) A small t powerful magnet near the center of the earth, to produce the uniform eld; and (2) sets of considerably weaker magnets located midway between e center and the surface, to produce the residual field and the secular riations. - V. S.

25. Nelson, J. H., and Ludy, A. K. Improvements and Modifications to a La Cour Magnetograph. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 441-446.

Improvements to the La Cour magnetograph relate to Z-variometer, -variometer, D-variometer, thermograph, time-flashing system, recorder, d diaphragms. By means of these alterations the magnetograph, originally signed for work in the polar region, is now adapted to moderate conditions. e writers report that during the final test period at the Cheltenham Obrvatory excellent results were obtained. The quality of the light spots as considerably better than the average now being realized. The modified Cour magnetograph will be installed in the new variation observatory nstructed during 1939 at Tucson, Ariz. - V. S.

7023. Swainson, O. W. Magnetic Work of the United States Coast and Geodetic Survey from April 1941 through March 1942. Nat. Research Council, Am. Geophys. Union, Trans. of 1942, part II, Washington, D. C., 1942, pp. 310-312.

An account is given of the work of magnetic observatories, cooperation with other organizations, special assistance from Works Project Administration, progress in data for nautical and aeronautical charts, issue of the isogonic chart of the United States, for 1940 field work in the Caribbean area for a new isogonic chart, and national defense surveys along the East, Gulf, and West coasts. In the defense work the vertical intensity (Z) had to be obtained. Since suitable instruments are lacking, tests were made of two experimental instruments, one being developed by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington and the other by the Geophysical Section of the Geological Survey. - V. S.

7027. Vacquier, Victor, and Affleck, James. A Computation of the Average Depth to the Bottom of the Earth's Magnetic Crust, Based on a Statistical Study of Local Magnetic Anomalies. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 446-450.

The earth's crust is composed of a sedimentary layer, a granitic layer, and an underlying layer. The writers describe the magnetic properties of each layer, their variations, and the resulting magnetic anomalies. On the basis of this information a method is further devised for calculating the average depth to the bottom of the earth's magnetic crust. On the one hand, a series of theoretical curves is plotted of the variation of the maximum anomalous vertical intensity with change in depth to the top of the magnetic igneous layer. On the other hand, a number of magnetic anomalies are selected from contour maps of vertical magnetic intensity, and statistical curves are plotted for the intensity as a function of the depth; the anomalies fall into two classes. Finally, by a curve-matching scheme, the best fits between the theoretical curves and the statistical curves are determined for each type of anomaly, thus providing two independent solutions of the depth to the bottom of the inhomogeneous magnetic layer. The calculations are given. They showed that the bottom of the layer of magnetic inhomogeneities is at an average depth of 11 to 15 miles from the earth's surface. - V. S.

3. SEISMIC METHODS

)28. Ayre, R. S. Experimental Response of an Asymmetric, One-Story Building Model to an Idealized, Transient Ground Motion. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, No. 2, 1943, pp. 91-119.

An experimental investigation was made at Stanford University of e effects of an idealized ground motion on an unsymmetrical one-story ilding model. The model was a rigid mass free to move only in a rizontal plane. It was mounted on a shaking table, the motion of which as a unidimensional, damped sinusoid. The motion varied in direction d frequency; the friction in the model, in magnitude and distribution. A tailed description is given of the experimental apparatus, procedure, sults, and conclusions. Some of the conclusions are as follows: (1) The stortion of parallel walls may differ greatly, for a particular direction d frequency of ground motion, as much as 350 percent; (2) relatively rge rotations may be induced because of coupling throughout the range ground frequencies; and (3) resonance can occur in any one of three tural frequencies instead of only two, as in the symmetrical system. - S.

29. Blake, Archie. On the Determination of Elastic Constants within the Earth from Seismometric Data (Abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1942, part II, Washington, D. C., 1942, p. 233.

In the absence of data good enough to permit the method of Pekeris d Slichter to be used, the most informative source of knowledge con- rning the elastic constants within the earth is the travel-time curves of e seismic P- and S-waves. The computation of the velocity function from e travel-time curve involves the solution of Abel's well-known integral uation. The treatment of this type of equation is facilitated on the theo- tical side by the terminology of functions as opposed to variables and the computational side by central difference methods and the use of achines.

)30. Blake, Archie. Progress Report on Periodicity and Time Series (Abs.). Nat. Research Council, Am. Geopgys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 407-408.

New statistics designed to detect effects not contemplated in the chuster periodogram are tried in a study of the series of aftershocks of the earthquakes of October 1935 at Helena, Mont. This work is done by the use of punch cards, which reduce the labor of computation. In the case of two types of departure from randomness, such as periodicity and smoothness, each effect disturbs the statistics designed to detect the other. Stricly speaking, the only rigorous treatment is to study them together. The author considers, however, that approximate methods, such as Bartels', for discounting the effect of one type of variation in studying the statistics designed to detect the other may likewise be useful. - Condensed by V. S.

7031. Campbell, R. B. Earthquakes in Florida. Proc. Florida Acad. Sciences, Tallahassee, Fla., vol. 6, No. 1, 1943, pp. 1-4.

A number of earthquakes have been recorded in Florida; these are listed. Seismic activity is distributed over two areas separated by the 27th parallel, the segment to the north corresponding to continental structure, and the segment to the south to the Atlantic region. This division corresponds to recent magnetometer studies. By recording seismic activity, it may be possible in the next few years to map subsurface structural trends. - V. S.

7032. Electronics. Film-Recording Seismograph. Albany, N. Y., vol. 16, No. 5, 1943, pp. 89-92.

Describes a Benioff film-recording seismograph. This apparatus has been developed at the California Institute of Technology and is used by the United States Bureau of Reclamation and the United States Coast and Geodetic Survey for determining whether the concentration of a very large weight, such as a water dam, on a small area can cause local earthquakes. The seismograph is equipped with a coil positioned in a doughnut-shaped magnet and employed to measure the motion of the earth with respect to a pendulum. Photographic recording is effected through a lamp-lens system connected with each seismometer and projecting a narrow beam of light on the galvanometer mirror. The resulting reflected beam falls on standard 35-mm. motion-picture film wrapped around a drum driven at constant speed. Special devices are used to assure accurate recording of the time of arrival of the different wave phases. An additional vertical seismographic element called the flasher is provided for registering the first impulses of local earthquakes. - V. S.

7033. Gutenberg, Beno. Earthquakes and Structure in Southern California. Bull. Geol. Soc. America, Washington, D. C., vol 54, No. 4, 1943, pp. 499-526.

During recent years the accuracy in determining the arrival times of earthquake waves in southern and central California has been notably mproved, so that more detailed results concerning the structure of the earth's crust in California are to be expected from the study of such records. Fifty shocks were selected, and their epicenters, depths of foci origin times, and magnitudes determined and discussed. All known corrections have been applied; in particular, the effect of the altitude of some of the stations is beyond the probable error of the readings. With his improved material it is possible not only to investigate more accurately han heretofore the wave velocities in the various layers but also differences n structure, especially local effects near the stations. - Author's abstract.

7034. Gould, M. J. Note on Relation of Ground Roll from Explosion to Ground Roll from Ground Shaker (Abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 329-330.

An experimental investigation is described on the propagation of round roll from an explosion and of surface waves from a ground shaker. The underground structure at the site of these observations was carefully etermined from a shallow refraction profile and logging. Dispersion urves are presented in the form of phase velocity as a function of L/H wave length ÷ thickness of low-velocity layer). The phase velocity of the round roll is a linear function of L/H, over the range of L/H observed. The surface waves from the ground shaker give a different dispersion urve over a lower range of L/H. The two curves seem to come together t L/H = 8. When the ground-shaker curve is taken to be the extension of he ground-roll curve to small L/H, the dispersion curve predicts the observed value of the group velocity of the ground roll.

035. Hayes, R. C. The Subcrustal Structure in the New Zealand Region from Seismic Data. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, No. 2, 1943, pp. 75-80.

A study of the distribution of focal depths of earthquakes has been nade in New Zealand. The purpose was to determine the subcrustal tructure in the region of the principal shocks during 1931-41. The results how the existence of a discontinuity of more or less regular form, its epth ranging from about 30 km. to more than 350 km. The vertical profiles uggest that below this discontinuity the material is so viscous as to have een distorted by plastic flow into folds. Earthquakes occur above the iscontinuity. The principal fold continues to be forced upward, causing ractures in the material above. - V. S.

7036. Jeffreys, Harold. On Pulses whose Travel Times Are Not True Minima. Proc. Cambridge Phil. Soc., Cambridge, Great Britain, vol. 39, part I, January 1943, pp. 48-51.

The wave theory of reflection is usually applied only to cases where the travel time of impulses is a minimum. Case "PP" is different; at any time after that of "P," a locus of points can be found on the sphere such that waves scattered thereat would be arriving. The writer studies this case as an example of impulses whose travel times are not true minima. A direct mathematical treatment meets insuperable difficulties; however, the same physical conditions characterize the spreading of a cylindrical explosion. A mathematical solution of this case is given. It suggests that when the travel time is not a true minimum, the pulse will be large and diffuse. This calculation agrees with seismological evidence. Thus, the anology of the cylindrical pulse can explain the diffuseness of the seismological pulses whose times are not true minima, and the large scatter of their readings. - V. S.

7037. Leet, L. D. Some Applications of Pure Seismology to Geological Problems (Abs.). Tulsa Geol. Soc. Digest, Tulsa, Okla., vol. 10, 1941-42, p. 42.

Three surface layers have been identified in northeastern America from refraction profiles obtained at the Harvard Seismograph Station. The travel times are given in a table:

Structure represented by trial travel times

Thickness (km.) From P	Thickness (km.) From S	Layer or zone	Poisson's ratio	Velocity (km./sec.) P	Velocity (km./sec.) S
16	15	Layer 1	0.27	6.13	3.45
13	10	Layer 2	.25	6.77	3.93
7	10	Layer 3	.23	7.17	4.27
		Zone of Pn, Sn	.28	8.43	4.62

In New Hampshire, travel times for elastic waves from two earthquakes in December 1940 yielded information on the mechanism of the shocks and their relation to the structure of the surface layers. The large shocks in northeastern America have been separated during the past 50 years by decreasing intervals, indicating that the area is in an epoch of growing seismicity. - Condensed by V. S.

038. Linehan, Daniel. Seismic Prospecting in New England. Nat. Research Council, Am. Geophys. Union, Trans. of 1942, part II, Washington, D. C., 1942, pp. 227-228.

Seismic studies in New England are enumerated. Ground motion
ring large quarry blasts has been studied with a three-component seis-
ometer by L. Don Leet; he made experiments in all of the New England
ates and in eastern New York State. Similar studies have been made by
. B. Slichter in the Triassic Basin in Connecticut. Surveys of depth to
edrock and dept of glacial and sediment cover were run with single-compo-
nt instruments by F. W. Lee and L. W. Currier in parts of Massachusetts.
eston College made studies in several States, mostly of the depth of cover
er bedrock. Other surveys are enumerated in the paper. - V. S.

39. Lynch, Joseph. Amateur Seismology (Abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, p. 400.

The two instruments that seem most feasible for worthwhile amateur
ork in seismology are the Sprengnether-Macelwane electromagnetic seis-
ograph, which Sprengnether will construct for $100, and the Joliat optical
ismograph, both vertical and horizontal. Details of both will be published
ter. During the year, the following colleges were visited with a view to
ousing amateur seismic interest in seismology: Carleton College, St.
atherine's College, St. Thomas' College, and St. Benedict's College -
l in Minnesota; Milton College in Wisconsin; and Bowdoin College in
aine. All promised active cooperation in future.

040. Lynch, W. A. Deep-Focus Earthquakes. Trans. New York Acad. Sciences, Lancaster, Pa., ser. II, vol. 5, No. 7, 1943, pp. 159-167.

A brief introduction deals with ordinary earthquakes, the detection
earthquake waves, and reflected waves. The discussion then turns on
e distinctive characteristics and distribution of deep-focus earthquakes.
ismological principles are summarized with reference to deep foci, and
me problems are indicated that arise from the discovery of these foci.
is shown that studies of deep earthquakes contribute to better understand-
g of the interior of the earth. - V. S.

041. Macelwane, J. B., and Sprengnether, W. F., Jr. The Sprengnether Vertical Seismograph. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 372-374.

The new apparatus aims to meet the demand for a simple, low-priced, short-period, vertical-component seismograph of fairly high sensitivity. Its construction is described with a drawing. The writers report that good records are obtained of local earthquakes and even of the shorter periods in the beginning of distant earthquakes, such as the recent Mexican earthquakes. - V. S.

7042. McComb, H. E. A Comparison of P-Phases as Registered by High- and Low-Magnification Seismographs (Abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, p. 374.

Upon close examination of a large number of seismograms recorded with low as well as high magnification, it is found that in many cases the first impulsive phase of the P-group may be preceded, for several seconds, by a drift of the light spot away from its normal position. Under such conditions it may be difficult, it not impossible, to estimate to the desired accuracy the time of arrival of the first motion. It has been common practice to designate such a phase as "e." High- and low-magnification instruments operating on the same pier have produced records having almost identical characteristics except, of course, in amplitude. This drift seems to occur most frequently on instruments having a long natural period and for this reason may be instrumental, although it has been noticed on seismograms registered by instruments having periods as low as 1 second. If the phenomenon is real - that is, if it represents an effective tilt immediately preceding an impulsive P-phase - then it probably should appear on all records of the same earthquake. If the cause is due to some characteristic of the instrument, such as its period, travel times of several minutes duration cannot be estimated to the required accuracy.

7043. Neumann, Frank. Progress Report on Seismological Activities of the United States Coast and Geodetic Survey, April 1, 1941, to March 31, 1942. Nat. Research Council, Am. Geophys. Union, Trans. of 1942, part II, Washington, D. C., 1942, pp. 231-233.

Report of teleseismic and strong-motion work, dealing with the instruments used at various stations, the nature of studies, the areas covered, the collaborating institutions, improvements in apparatus, etc. A special report has been issued analyzing the accelerogram of the Imperial Valley earthquake of May 18, 1940; therein ground motion is discussed for the first time in terms of longitudinal, transverse, and rotational motion, and period data are in the form of envelopes. - V. S.

044. Pekeris, C. L. The Propagation of an SH-Pulse in a Layered Medium (Abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 392-393.

An exact solution for the problem of the propagation of an SH-wave due sudden application of a concentrated torsional stress at the surface of a yered medium. The solution is obtained in terms of elliptic integrals. The rm of the displacement in the direct wave is like the time derivative of the plied stress. The beginning of the refracted waves is like that of the stress. t moderate distances from the source the internally reflected waves are rge and increase in relative magnitude with the abruptness of the stress. he displacement at r = 4H due to the application of a stress pulse of the dicated form is shown on the drawing. It is suggested that the arrival time a totally reflected SH-wave should be taken at the point of maximum amplide of the phase rather than at its beginning.

045. Potter, E. V. An Electrical Transducer Circuit for Use with Capacity Pick-Up Devices. Rev. Sci. Instruments, Lancaster, Pa., vo. 14, No. 5, 1943, pp. 130-135.

An electrical circuit suitable for converting changes in capacity into hanges in a rectified electrical current has been developed by the Bureau Mines and has been used in seismic work as well as other studies in hich mechanical vibrations are involved. The circuit employs two radioequency oscillators and a rectifier and can be operated from batteries or 10-volt, 60-cycle alternating current. Sensitivities up to 2 ma. per microicrofarad change in capacity and a current range of 5 to 40 ma. can be btained with 2516 oscillator tubes. This transducer circuit has the following dvantages: Its sensitivity, current range, and the shape of the current apacity curve can be readily changed. It is simple to operate. It can be sed to study vibrations or capacity changes having frequencies from 0 to ver 200 kc. per second. Its sensitivity depends on absolute changes in apacity rather than the relative change in total capacity. It has low backround-noise level. It is free from interference by local magnetic and lectrostatic fields without requiring shielding, except when such fields are lose to the operating frequency of the two oscillators. - Author's abstract.

046. Ramírez, J. Emilio. The Geophysical Institute of the Colombian Andes. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 33, No. 2, 1933, pp. 81-90.

The Instituto Geofísico de los Andes Colombianos was inaugurated in 941. It consists of the Seismological Station and the Meteorological

Observatory of San Bartolomé, at the Colegio de San Bartolomé, Bogotá, Colombia. The nearest earthquake station to the northwest is in Balboa, Canal Zone; to the north, in Puerto Rico; to the west, in Honolulu; to the south, in Huancayo; and to the east, in Rio de Janeiro. - V. S.

7047. Rupnik, J. J., and Legge, J. A., Jr. The Determination of the Velocity Function ($V = V_o + az$) for Any Given Set of Time-Depth Data by Means of the Method of Least Squares (Abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 328-329.

A method is described, and an example worked out, for making a best linear fit to any given set of time-depth observations such as those obtained by well shooting. Using the formula $z = (V_o/a)\ (e^{at} - 1)$, a least-squares solution is developed and then applied to a hypothetical set of vertical times and depths.

7048. Schulz, P. E. Some Characteristics of the Summit Eruption of Mauna Loa, Hawaii, in 1940. Bull. Geol. Soc. America, Washington, D. C., vol. 54, No. 6, 1943, pp. 739-746.

The 1940 eruption of Mauna Loa was confined to the summit crater, Mokuaweoweo, and the upper southwest rift. The rapid outpouring of the first day produced a lava lake, locally over 50 feet deep, over a large part of the crater. During cooling and solidifying the original surface settled from 0 feet where the flow was a foot or less deep, to 9 feet where the fill was 50 feet deep. Cooling accounts for but a small percentage of this volume decrease. The collapse of the crust that produced slump scraps along the crater walls was rapid enough to pull some of the plastic material on the under side of the crust into the form of stalactites. The intrusion of the lava under the crust of the initial flood raised pressure ridges and pressure plateaus. - Author's abstract.

7049. Seeburger, M. M. Different Types of Distubances Appearing on Iowa Seismological Records. Proc. Acad. Science for 1942, Des Moines, Iowa, vol. 49, 1942, pp. 367-373.

The Des Moines Seismological Station is compiling an atlas of typical records of earthquakes and other disturbances. The shocks listed vary in distance from 230 to 15,000 km.; they range from normal depth to 590 km. below the surface. Records date back to December 1, 1934. The author discusses disturbances affecting records - tilt, wind tremors, microseims - and examines different types of shocks; a few examples of records illustrate the text. - V. S.

050. Stanton, A. N., and James, V. N. Square-Wave Testing of Seismograph Components (Abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 326-327.

In testing amplifiers and other equipment components used in geophyical research, the inherent phase characteristics as well as the amplitude haracteristics may be simultaneously analyzed by means of square waves. he wave shapes resulting from the application of square waves may readily e shown to correspond to transient responses of simple R, L, and C ircuits. Performance tests on seismic equipment components will be emonstrated.

051. Walter, E. J., and Birkenhauer, H. F. Travel-Time Tables for Near Earthquakes in East-Central North America (Abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, p. 406.

These tables are based on studies by E. J. Walter of six earthquakes ccurring south of St. Louis and by H. F. Birkenhauer of eight earthquakes ccurring east and northeast of St. Louis. In both regions the velocity of ompressional and shear waves was determined for the several layers omposing the crustal structures. Times of arrival for the P-phases and he S-phases of the latter region, as well as the (S-P)-intervals, were calcuated. These times have been compiled into a table that is serviceable for dentifying phases in either region, with the exception of the slowest phases f earthquakes from southern azimuths. - Condensed by V. S.

052. Widess, M. B. Multiple Branches in Seismic Reflection-Time Surfaces. Geophysics, Menasha, Wis., vol. 8, No. 2, 1943, pp. 93-104.

When for a given shot point and receptor more than one reflection is ecorded from a given reflecting bed, the corresponding reflection-time urface may be said to be multiply branched. Although multiple branches re difficult to evaluate, serious errors in mapping may result when their resence is overlooked. A method is therefore proposed for the interpreation field data to account for this phenomenon. The conditions for branchng and its properties are considered, showing that branches must occur in dd-numbered sets and in certain forms, which are illustrated. - Author's bstract.

053. Wilson, J. T. A Statistical Study of the Periods and Amplitudes of Microseisms. Nat. Research Council, Am. Geophys. Union, Trans. of 1942, part II, Washington, D. C., 1942, pp. 228-231.

The current view is that microseisms are Rayleigh waves. The work of Ramirez, Krug, Leet, Archer, Byerly, and Wilson supports this opinion but points to waves from several directions. Similarly, the amplitude ratios of the Berkeley microseisms, as well as Uccle results, indicate that microseisms might be a mixture of Rayleigh waves and some other waves, with dominantly horizontal motion. Furthermore, the observed amplitude ratios do not agree with the theoretical ratios computed by A. W. Lee and Suzuki. Finally, the difference in period recorded on the vertical and horizontal components averages almost one-half second and is consistent throughout the year. This evidence can be explained, according to the writer, by the assumption that microseisms are a mixture of Love and Rayleigh waves and that the Love waves are of slightly longer period. - V. S.

4. ELECTRICAL METHODS

7054. Briggs, Frank. Electric Pilot Promises Better Oil Recoveries. Oil Weekly, Houston, Tex., vol. 109, No. 10, 1943, pp. 13-16.

The electric pilot is an instrument lowered into the well by means of a cable. A current will flow through the cable if the pilot is in acid or salt water and will not flow if it is in oil. Thus, at the point of fluid interface where acid ends and oil begins, the instrument will indicate a break of circuit. The construction of the pilot and the method of operation are described and illustrated by drawings. - V. S.

7055. Howell, B. F. Some Effects of Geologic Structure on Radio Reception. Geophysics, Menasha, Wis., vol. 8, No. 2, 1943, pp. 165-176.

Radio fields at standard broadcast frequencies were examined over faults to determine how the geologic conditions affected the fields. The fields in rugged and densely inhabited areas were found to be too irregular to yield understandable patterns. Very small variations in the directions of the fields were suggested but not proved over the San Jacinto fault. No variations in intensity were found over the San Andreas fault, but variations were observed at some places over the Piedmont fault in New Jersey. Such variations might be due to higher conductivity of the fault zone, or to the addition of waves reflected and refracted at the fault surface. Weak areas near San Bernardino were noted, but could not be correlated with faults. It seems improbable that surveys using standard broadcast signals will be of much value in studying radio weak spots, although other approaches may be more revealing. - Author's abstract.

56. Joslyn Manufacturing & Supply Co. Joslyn Direct-Reading A. C. Soil-Resistivity Meter. Chicago, January 20, 1942, Pamphlet.

Material describing the Joslyn type SR-3 soil-resistivity meter, which
direct reading and uses two metal rods joined by a lead wire for contact
th the ground and a self-rectifying vibrator, driven by flashlight cells, to
ovide A. C. to the ground. A meter on one rod is calibrated to read
sistivity of the soil from 0 to 10,000 ohm.-cm. The instrument is used
pipeline soil-resistivity surveys and is made by the Joslyn Manufacturing
Supply Co. of 3700 South Morgan St., Chicago. - D. W., Mines Mag.,
nver, Colo., vol. 33, No. 3, 1943.

57. Matubara, A. The Electrolytic Method of Prospecting. Jour. Min. Inst. Japan, Tokyo, vol. 53, 1937, pp. 515-528, 571-587.

A polarization method is described by which the counter-e.m.f. of
electrochemically active ore body can be measured in relation to a
imulating potential. - C. A. H., Annotated Bibliography of Economic Geo-
gy, vol. 14, No. 1, 1942, p. 133.

58. Mounce, W. D., and Rust, W. M. Natural Potentials in Well Logging (Abs.). Oil Weekly, Houston, Tex., vol. 109, No. 10, 1943, pp. 56-57.

The electrical log variation is not directly related to permeability of
essure. The electrofiltration potential is actually determined by the
emical nature of the filter and the condition of its surface. If the log does
ow permeability, it is that of the filter cake. However, since the perme-
ility of the filter cake is higher than the permeability of shale, the natural
tential might differentiate between permeable sands and shales. Experi-
ents have shown that less than 10 percent of the observed potential is
aceable to electrofiltration potential. The remaining 90 percent cannot
ascribed to electrochemical potential, because the sum of such potentials
ound any point on the electrode must be zero. The authors experimented
ith nonpolarizing electrodes, which suggest that shale zones are the seat
the phenomena. From the results of these test, they conclude that when
esh-water drilling mud is used, the potential log may be largely a measure
the absence of argillaceous material in the formation. - Condensed by V. S.

59. Ramachandra Rao, M. B. Spontaneous Polarization Surveys Near Guddadarangavvanahalli, Chitaldrug, Mysore State, India. Am. Inst. Min. and Met. Eng. Tech. Pub. 1613, New York, 1943, 7 pp.

Gold, copper, lead and antimony have been noticed for several years near Guddadarangavvanahalli, Chitaldrug. The Imperial Geophysical Experimental Survey cooperated in the planning of spontaneous polarization surveys. Electrical potentials were measured along a closely laid out network of stations, and equipotential lines were drawn by interpolation. The apparatus consisted of a d.c. potentiometer, and a special type of nonpolarizing electrode. It was found that one positive potential center corresponded exactly in position with a definite lode of pyritiferous graphitic schist; the apex of this lode was discovered about 100 feet below surface. The negative potential centers did not indicate the occurrence of any important ore bodies. - V. S.

5. RADIOACTIVE METHODS

7060. Goodman, Clark, and Evans, R. D. The Radioactivity of Rocks. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 544-547.

A comparison between radioactivity measurements of rocks made before 1936 and the newer experimental measurements points to the need of a downward revision of the older figures. The present estimates indicate a decrease of 40 percent in the average radium content of acidic rocks and of 60 percent for basic rocks; too few intermediate rocks have been measured to give conclusive results. The writers present evidence that the new measurements are more reliable than the old measurements. The downward revision of the average radioactive content of rocks brings about a corresponding downward revision of the rate of heat generation by radioactivity in rocks. The new values of heat generation for acidic and basic igneous rocks are somewhat less than one-third of the values of Holmes, based on the old radioactivity measurements. - V. S.

7061. Keevil, N. B. The Distribution of Helium and Radioactivity in Rocks - Rocks and Associated Minerals from Quebec, Ontario, Manitoba, New Jersey, New England, New Brunswick, Newfoundland, Tanganyika, Finland, and Russia. Am. Jour. Science, New Haven, Conn., vol. 241, No. 5, 1943, pp. 277-306.

The radioactive contents and the Helium indexes of more than 25 rocks and associated minerals have been determined. In general, low values of the helium index are attributed to escape of helium; occasionally extraneous helium is present. The mafic minerals are generally three times as active as the felsic constituents of a rock, and concentration of the radioactivity of a rock in its accessory minerals is often indicated.

Within the eastern coast belt of North America two ages are suggested
r the Paleozoic granitic intrusives. In the Rouyn area, Quebec, and near
ngston, Ontario, the results with a prediabase age for acidic intrusives,
t an older age for the Varsan granodiorite is suggested by helium-index
ta. The helium index of a granite from Petersen Lake, Manitoba, is con-
rdant with results for other "Algoman" granites; helium indexes for two
e-Cambrian rocks from Tanganyika are of the same order of magnitude,
t two indicate an abnormal loss of helium. A greater value of the helium
lex for the litchfieldite than for the syenodiorite at Blue Mountain, Ontario,
in accord with recent geological evidence. A diabase from Russia and a
ystalloblastic pillow lava from Manitoba gave higher values for the helium
dex than might be expected. Closer approximations to age were obtained
th iron minerals. - Author's abstract.

62. Russell, W. L. Radioactivity of Sedimentary Rocks. Tulsa Geol.
Soc. Digest, Tulsa, Okla., vol. 11, 1942-43, pp. 62-63.

Well Surveys, Inc., made 510 radioactivity determinations during
40-43. The results showed that coal, nodular chert, limestone, dolomite,
d pure sandstone are weakly radioactive; silt, shale, and volcanic ash,
ther highly radioactive; and marine oil shales, very high radioactive.
dioactivity was found to increase with fineness of the grain in clastic
cks, with darkness of the shade of rocks, and with content of marine oil
ale in rocks. The samples of sedimentary rocks displayed about 1.3
nes more radioactivity than the average granite. - Author's abstract,
ndensed by V. S.

63. Tiratsoo, E. N. Radioactivity and Petroleum. Petroleum, London,
vol. 4, No. 3, 1941, pp. 58-60.

This paper offers a theory of oil formation. It reviews the general
inciples of radioactivity, their relations to helium, the action of α-rays
hydrocarbons, and the decomposition of nitrogenous compounds. Therein
e writer explains the absence of hydrogen and the presence of nitrogen in
e hydrocarbon series. He further assumes that this series has been formed
om an initial pure hydrocarbon by ionization from α-radiation. M. N.
ogers suggests that the initial hydrocarbon may be methane; the experi-
ents of Lind and Bardwell tend to support this view, but the writer finds it
necessary to postulate methane as the original starting point. The work of
dy, McFarland, and Lind suggests that any organic substance containing
e atoms C, H, N (as in all animal and vegetable matter), must break up on
-radiation into simple hydrocarbons and nitrogen. The hydrocarbons will
en be converted by further -ray action into a succession of higher

members with the liberation of methane and hydrogen, the latter gas going eventually to hydrogenate the oil that is formed. - V. S.

6. GEOTHERMAL METHODS

7064. Briggs, Frank. The Temperature Bomb. Oil Weekly, Houston, Tex., vol. 110, No. 4, 1943, pp. 15-17.

Well thermometers are of two types - resistance thermometers and fluid-expansion thermometers. The latter type is called a "temperature bomb." It contains a gas-filled bulb connected with a Bourdon tube to which is attached a recording pen. As the temperature of the medium around the bulb changes, the gas in the bulb and tube expands or contracts, causing the recording pen to trace a curve. The sealed bulb may contain methyl chloride, which is very responsive to temperature changes. The instrument works in pipes of conventional size. A description is given of one such thermometer in regard to structure, operation, interpretation of data and uses. - V. S.

7065. Clark, Harry. The Effects of Simple Compression and Wetting on the Thermal Conductivity of Rocks. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 543-544.

Known thermal gradients of the earth range from 3° per km. to 150° per km. At least part of the variation is due to a difference in the thermal conductivity of rocks through which the heat flows. The writer and Dr. Birch investigated the effects of compression and wetting on the thermal conductivity of sedimentary rocks - shales, sandstones, and limestones. The compressing apparatus is described. The results show that compression produces only small effects on the slate and the igneous rocks. For sedimentary rocks of low porosity, marble and Doubling Gap sandstone, the effect of compression alone is about the same as the combined effects of pressure and wetting. For the more porous rocks the effect of water is greater than that of compression. The effect of compressing the wet rock is small in every instance. - V. S.

7066. Kovner, S. S. Contribution to the Thermic Prospecting. Comptes rendus (Doklady) Acad. Sciences U.R.S.S., Moscow, vol. 32, No. 6, 1941, pp. 397-399.

Thermic prospecting utilizes irregularities in the earth's thermal flow produced by foreign bodies in otherwise homogeneous mediums. The uthor deals with such a foreign body shaped like an elliptic cylinder. He dds two further limitations: (1) Absence of other factors affectting the ermal flow; and (2) homogeneity of the various materials composing the edium. So conceived, the case still preserves prospecting significance. is treated as a generalized Dirichlet-Neumann problem succeptible of olution by means of Fredholm integral equations. The data used are umerous typical profiles and relations of thermal conductivity calculated ccording to Liebmann's method of nets, simplified by the author. The esults are presented in two curves. One curve shows the design of the ermal state of a salt dome; the other, the findings that should be expected om thermal prospecting at a depth of 250, 125, and 62.5 meters, resoectively. is found that the thermic profile repeats the profile of the dome. - V. S.

067. Zies, E. G. Temperatures of Volcanoes, Fumaroles, and Hot Springs. Carnegie Inst., Washington, Geophys. Lab., Paper 1032, 1941, 19 pp.

Temperature measurements by optical pyrometer of temperatures in olten lava during an explosive eruption of the volcano of Santiaquito, in uatemala, gave a value of about 700° C., and tests with a thermocouple iserted into a sizable fragment of ejected volcanic material gave a value f 690° C. Observations at Kilauea with a thermocouple gave a temperature f 1050° C. and by optical pyrometer a range of from 1070° to 1185° C. The rticle gives information of value in the interpretation of geothermal easurements. A bibliography of 24 items is included. - D. W., Annotated ibliography of Economic Geology, vol. 14, No. 1, 1942, p. 128.

7. GEOCHEMICAL METHODS

068. Pirson, S. J. A Two-Year Summary of Geodynamic Prospecting Results (Abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 327.

The paper summarizes results obtained over the past 2 years with e new technique of gas-leakage measurements. Numerous examples of esults are shown in an objective manner so that those who are interested the survival and maintenance of the oil business according to past wildatting practices may make their own appraisal of one of the new ideas that ave been submitted as holding a potential solution to the problem of dwindling il discoveries and reserves. The examples illustrated are grouped in two asses: Predictions made on the probable outcome of drilling wells before eir completion and exploratory drilling surveys.

7069. Price, R. P., and Headlee, A. J. W. Geochemistry of Natural Gas in Appalachian Province. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 26, No. 1, 1942, pp. 19-35.

Results of further studies on the variations in composition and properties of natural gas by geologic and geographic distribution. A résumé of the geologic occurrence of methane, ethane, and higher-boiling saturated compounds, nitrogen, carbon dioxide, and hydrogen sulfide is given. It is concluded that variation in the composition of natural gas in the above-named province appears to correlate with sedimentary environment more closely than with structure of the region, as the latter is influenced by dynamic metamorphism. It was found that the different compounds in natural gas were distributed in a given reservoir, and a map of their distribution indicated the position of the gas, oil, and water with respect to each other. A definite relationship appears to exist between the composition of a natural gas and associated oil, both on an areal and a quantitative basis. The article carries much of background interest relative to soil-analysis procedures. - D. W., Mines Mag., Denver, Colo., vol. 33, No. 3, 1943.

7070. Tripp, R. M. On a Geochemical Survey of the Fort Collins Anticline (Abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 326.

An objective presentation of data derived from a hydrocarbon survey of a producing Rocky Mountain structure. The influence of secondary mineralization and radioactivity on soil-wax patterns is discussed briefly.

7071. ZoBell, C. E. Bacteria as Geological Agents with Particular Reference to Petroleum. Petrol. World, Los Angeles, vol. 40, No. 6, 1943, pp. 30-43.

This article has appeared under the title "Influence of Bacterial Activity on Source Sediments," in Oil Weekly, Houston, Tex., vol. 109, No. 8, 1943, pp. 15-26. (See Abs. 113, No. 6937.)

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

7072. Bell, H. W. Porosity Limit with Depth. Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 9, 1943, pp. 66-67.

Porosity must disappear at some depth owing to increasing pressure and heat. The fluids contained in pores will also disappear. The author calculates that the minimum depth of a collapse of porosity may be 21,000 eet, with wide variations. Some of the reservoirs may have lost their orosity at a depth of about 14,000 feet, but others may remain open with easonable porosity at 80,000 feet. The oil in a reservoir compressed ntil porosity collapses must go into the gaseous phase, enter the available ores of the surrounding shales, and finally combine chemically with the ormation. At the end of the paper a discussion by W. V. Howard deals with he organization of experiments. - V. S.

073. Born, W. T. The Contribution of Geophysical Laboratories. Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 259-264.

According to information gathered in March 1943 geophysical laboraories in the United States have contributed extensively to the war. Some 0 to 50 percent of their technical staffs have been released to the armed orces or to Government laboratories. With the remaining personnel, the aboratories work mostly for the war. 80 percent of the reporting laboraories are engaged directly in war activities. They manufacture instruments f precision, such as ordnance gages for the Army and Navy, special tools nd dies for the aircraft industry, Radar parts, etc. They also do research n new devices, mostly under the supervision of the National Research efense Committee. - V. S.

074. Bramel, H. R. Structure Chart for Solving Geological and Mining Problems. Eng. and Min. Jour., New York, vol. 144, No. 7, 1943, pp. 82-83.

A method is offered for solving in the field certain problems of tructural geology involving descriptive geometry. A nail is driven perpenicularly into the flat surface of a board. To the nail is attached a string. f the free end of the string is held at various points on the board, the angle etween the string and the board may be adjusted at will. For a given angle he string will touch the board on a particular circle with the nail at its enter. It follows that circles representing various angles of pitch of inciation may be drawn and labeled. If radial line representing geographical earings are now laid out on the board with the nail as the center, the string nay be used to designate lines of any given pitch, of any bearing, or of both. urther, any pitching line may be represented on the diagram as a point nd any dipping plane as a line. The application of this method to the followng problems is described: (1) The pitch and bearing of the intersection of wo planes; (2) the apparent dips of planes, cut by geological sections; (3) wo components of dip defining a plane; (4) three points defining a plane; (5) ine elements of planes; and (6) the true or dihedral angle between two lanes. - V. S.

7075. Bridges, R. T. The Geologist: His Work in South Africa. South African Min. and Eng. Jour., Johannesburg, vol. 53, 1942, No. 2564, pp. 57-58; No. 2565, pp. 77-81.

Part 1. The Author points out that geology is a science, and science is the search for truth by experiment, observation, and logical deduction. The application of economic geology in the sensational alluvial diamond deposits of Namaqualand by geologists, where in 6 weeks 150,000 pounds sterling value were recovered, is recounted. The Lichtenburg Diggins, from which 10 million pounds sterling in diamonds was obtained in 1926 to 1929, and the part played by geologists in this area are discussed. The aid of geologists and the contribution of geophysical work in the development of the West Witts area are also described. The article shows the place and value of geological science in economic problems.

Part 2. The work of economic geologists on the staffs of active gold-mining companies and its value, are considered. The growth and importance of geophysical investigations in mining and on water location, and the work of the Union Geologic survey, are treated. Other topics under the general heading of the article are also discussed. - D. W., Mines Mag., vol. 33, No. 4, 1943.

7076. Bucher, W. H. Mechanics of Crustal Deformation (Abs.). Tulsa Geol. Soc. Digest, Tulsa, Okla., vol. 10, 1941-42, pp. 50-61.

Crustal deformations arise when the crust adjusts itself to the diminishing surface of the slowly shrinking body of the earth. The crust sags, wrinkles, and tears in the struggle for space. In the sags and primary furrows, basic and ultrabasic igneous rocks prevail almost to the exclusion of the more acid types. On swells, the same rocks predominate. The highly localized strong magnetic and gravity highs in the oil regions of the Middle West and Southwest suggest that this is a broad phenomenon. The acid series is limited to orogenic belts that have undergone strong deformation. Thus, the outer part of the crust shears off the rest in the process of orogenic deformation. In the other structural types, the magmas come into existence in the lower crust and make their way upward, largely unchanged. Superimposed on the described mechanism is the factor of great cycle, which forms new geosynclinal zones cutting across the older ones. This cycle represents a rhythmic alteration of compression and tension in the crust and seems to point to thermal changes beneath the crust as the ultimate causes. - Condensed by V. S.

077. Campbell, R. B. Petroleum Exploration Methods. Proc. Florida Acad. Sciences for 1940, Gainesville, Fla., vol. 5, 1941, pp. 172-188.

This paper discusses the origin of petroleum, accumulation of oil,
eological methods, geophysical methods, and geochemical methods;
ncludes maps and cross sections. In the treatment of geophysical methods
distinction is made between two classes: (1) Mapping - gravitational and
nagnetic, and (2) sounding - seismic and electric. The four varieties are
escribed. The approximate cost per month is: (1) Magnetometer, $1,000-
,500; (2) gravimeter, $4,000; (3) reflection seismograph, about $10,000;
nd (4) electrical survey, $10,000. The geochemical methods should be
onsidered as yet comparatively uncertain but promising. - V. S.

078. Case, L. C. Oil-Field Waters (Abs.). Tulsa Geol. Soc. Digest, Tulsa, Okla., vol. 10, 1941-42, pp. 45-48.

In prospecting for oil, generalizations concerning the effects of oil
nd water on one another have not proved helpful. No group of relationships
ppears to hold from one area to another. A summary of the evidence
rought forth by Revelle, Twenhofel, Rich, Heck, and others indicate that
il may have either been formed or destroyed according to local environ-
nental conditions. Also, water may have been entrapped in almost any con-
eivable concentration and composition. Concentrations range from about
,000 p.p.m. total solids in Rocky Mountain oil-field waters to above 400,000
.p.m. in Michigan brines. However, studies of local conditions in a given
rea, apparently, can be useful to prospectors. Subsurface water character-
stics sometimes indicate structure that may, in turn, point to the existence
f oil. Numerous instances are known of the location of delineation of faults
y water analysis. The writer concludes that in prospecting it is necessary
o discover in each instance the specific local relationships between oil and
vater for the given area, by a study of drilled wells gone to water. - Con-
lensed by V. S.

079. DeGolyer, E. L. War Demands More Oil - More Exploration. World Petrol., New York, vol. 14, No. 3, 1943, pp. 26-28.

War has created great difficulties in producing, refining, transporting,
nd exploring for oil. Exploration problems are particularly important.
The United States consumes almost 1 1/2 billion barrels annually. Apparently,
here is nothing to justify the belief that we can continue indefinitely to dis-
cover such a quantity of oil. It is true that during 1926-38 an average exceed-
ng 2 billion barrels was discovered annually, owing to the advent of geo-
hysics. But otherwise there were in the past only 2 years, 1901 and 1921,

when as much as 1 billion barrels of reserves was discovered in a single year. Beginning with 1938, the situation has been discouraging. Exploration has advanced to an all-time peak, and the number of yearly discovered fields has increased, but the reserves discovered annually have dropped sharply, and the average reserves discovered per field have declined. Yet the war is continuously increasing the consumption of oil. Accordingly, the author concludes that we shall need more oil then we are able to produce; certain areas will experience shortages in productive capacity within the very near future. - V. S.

7080. Howard, W. V. The Derivation of Reservoir Rocks, Part I. Oil and Gas Jour., Tulsa, Okla., vol. 42, No. 7, 1943, pp. 158-160, 183-187.

The materials that form reservoir rocks are derived from the disintegration and decomposition of older rocks. Each rock exposed to erosion provides material that is transported seaward and may form new sediments or may alter the composition, porosity, and permeability of those already deposited. The leached material remaining may also form reservoirs. In this installment, reservoirs derived from sandstones of the quartzitic type are discussed. The relationships of other rock classes will be taken up in subsequent articles in the series. - Author's abstract.

7081. Howard, W. V. Exploration Methods Combine Old and New Practices. Oil and Gas Jour., Tulsa, Okla., vol. 39, No. 47, 1941, pp. 40-41.

The article evaluates petroleum-exploration procedures. Methods are listed in order of generally increasing accuracy and increasing cost as follows: (1) Geological interpretations of logs of wells drilled by others; (2) surface geology (where possible); (3) magnetic surveys and/or electrical surveys (in limited areas where they work); (4) gravity surveys and/or soil analyses; (5) regional core drilling; (6) seismic surveys; (7) intensive core drilling with electrical and geochemical logs; (8) drilling for production development. This listing, supplied by J. L. Adler, is discussed from various angles, and it is brought out that surface structures are not all found and that there is a trend back to the older methods (surface geology) and a realization that newer methods should supplement rather than crown out older ones. xxx - D. W., Annotated Bibliography of Economic Geology, vol. 14, No. 1, 1942, p. 122.

7082. Kelly, M. E. Well Logging. Fuel, London, vol. 22, No. 3, 1943, pp. 55-56.

Briefly outlines existing methods of well logging: (1) Electrical nd permeability logging; (2) radioactivity or ray logging; (3) neutron r hydrogen logging; and (4) geochemical logging. - V. S.

083. Levorsen, A. I. Role of Stratigraphy in Oil Geology. Pan-Am. Geol., Des Moines, Iowa, vol. 77, No. 5, 1942, pp. 323-326.

The author discusses a working definition of a stratigraphic field. V. B. Wilson divides the closed reservoirs into four groups: (1) Reservoirs losed by local deformation of strata; (2) reservoirs closed because of arying porosity of rock (contours may not close if drawn on upper surface f reservoir only - no deformation of strata is necessary other than regional ilting); (3) reservoirs closed by combination of folding and varying porosity; nd (4) reservoirs closed by combination of faulting and varying porosity. The author adopts this classification. He defines stratigraphic fields as hose producing chiefly from reservoirs of class (2), together with those of lasses (3) and (4) when the porosity factor is dominant. - V. S.

084. Maximovich, G. A. Porosity of Geospheres. Comptes rendus (Doklady) Acad. Sciences U.R.S.S., Moscow, vol. 37, Nos. 7-8, 1942, pp. 215-217.

The data of hydrogeological, mining, and oil-prospecting expeditions, unning into tens of thousands of estimates, have been used for a calculation f the minimal, maximal, and average porosity of different rocks and geospheres. The results are contained in a table, "Porosity of Rocks in Different Geospheres," covering hydrophilic and hydrophobic geospheres, arious rocks and muds, porosity (in percentages), approximate number of stimates, and average porosity for geospheres. It is found that the porosity f geospheres ranges from 0.5 in the pelo- and pedo-sphere down to 0.01 nd less in the granito- and basalto-sphere. The porosity of surface geospheres is determined by their position in the earth crust, and it depends n thermodynamic conditions. This dependence accounts for the decrease f the average porosity in the direction from the pedosphere to the core. - V. S.

085. The Oil Weekly. Results of Intensive Wildcatting Not Enough to Meet Needs. Houston, Tex., vol. 110, No. 8, 1943, pp. 21-30.

The United States Petroleum Administration for War considered that 4,500 wildcat wells should be drilled in 1943, as compared with 3,166 rilled in 1942 and 3,264 in 1941. Actually, in the first half of 1943, 1,602 exploratory tests were completed in the United States, indicating an annual rate of 3,204 wildcats or only 71 percent of the 4,500 regarded essential. Even less satisfactory is the rate of actual discoveries. The number of successful wildcats was 20 percent lower this year than last year, having totaled only 224 against 281. Only 14.9 percent of the total wildcats of the first half of 1943 discovered new sources of oil, distillate, or gas, in comparison with 18.4 percent that were productive in the first half of 1942. The gas discoveries showed no decline, but oil discoveries declined. New oil fields found in the first half of 1943 totaled 133 against 161 last year, a decrease of 17 percent; discoveries of new oil horizons dropped from 86 to 51, a decline of 41 percent. The paper describes the success of drilling in the different States. A comprehensive table is included, "Wildcats Completed in the United States in First Half of Year". - V. S.

7086. The Oil Weekly. Scientists Seriously Consider Improving Oil Finding. Houston, Tex., vol. 109, No. 6, 1943, pp. 36-40.

At the annual meetings of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists, and the Society of Economic Paleontologists and Mineralogists in Fort Worth, the papers presented stressed the need for finding more oil fields. The situation was regarded as critical by most speakers. The remedies suggested included "discovery thinking," cooperation in prospecting, broadening of geophysical exploration, use of new methods and instruments, wildcatting, utilization of stripper wells, price increases, and adequate supply of manpower. - V. S.

7087. Parsons, C. P. Caliper Logging. Trans. Am. Inst. Min. and Met. Eng., Petrol. Devel. and Technol., Petrol. Div., New York, vol. 151, 1943, pp. 35-47.

Caliper logging is a practice of measuring the variations in the diameter of the open hole in a well. This information is useful for many purposes, among which are: Determining the volumetric capacity of the portion of open hole to be cemented; the amount of gravel to be used for gravel-packing a well; the size and location of seat for a packer to be placed in a well; studying the effects of nitroglycerin shots; studying the effects of acidizing; studying the cause of drill-pipe failures; studying drilling technique; geological correlations. This is a new practice in oil fields and is eliminating considerable guesswork. - Author's abstract.

7088. Patrick, H. G. Transportation. Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 256-259.

This paper is one of a series presented at a conference on maintaining geophysical operations during the war in Fort Worth, Tex., April 7, 1943. The author discusses the transportation difficulties experienced by geophysical operators and shot-hole drillers in the Southwest and Midwest in regard o tires, new automotive equipment, and spare parts. He finds that so far oil inding has been carried on with little new equipment. If, however, diligent exploration is to be continued, the geophysics industry will need new trucks and an adequate supply of replacement parts. - V. S.

7089. Petroleum World. Geology of Sedimentary Rocks. Los Angeles, Calif., vol. 40, No. 6, 1943, p. 26.

P. D. Krynine lectured before the Pacific Section of the American Association of Petroleum Geologists on sedimentary rocks. He believes that he nature of the sedimentary deposits in oil regions furnishes information on reservoir characteristics and discovery problems. The individual grains orming the oil-field rocks are crystal fragments of the solid rocks from which he sediments were eroded. Under certain conditions, these crystal fragments continue to grow slightly after being carried away by erosion. Such renewed crystal growth is an index of the original conditions of deposition and can serve as a guide to oil. - V. S.

7090. Roberts, John. The Search for Oil. Petrol. Times, London, vol. 47, No. 1,196, 1943, pp. 255-256, 264.

Oil fields occur in zones of great rock disturbances. This relationship s well-illustrated by the Parma-Bologna region, Italy, where oil fields ollow the contour of the Apennines, at a distance of about 30 miles from he ridge. The same relationships are found in the Caucasus, the Carpathians, he Andes, North American coastal ranges, and the Persian, Burmese and East Indian mountains. It is further known that oil forms at high temperatures. Accordingly, the presence of marble and anthracite in a region is likewise an ndication of oil deposits, because these rocks form at about 800° C. In the Allegheny region are found antracite, graphite, marble, and oil. The author draws conclusions as to the mechanism of oil formation and infers that there can be oil in the British Isles. - V. S.

7091. Thom, W. T., Jr. The Major Deformational Patterns Characteristic of the Earth's Crust and Their Mechanics-of-Origin. Nat. Research Council, Am. Geophys. Union, Trans. of 1942, part II, Washington, D. C., 1942, pp. 708-710.

Available evidence shows that the earth's crust can move laterally with respect to the centrosphere, that surpluses of crustal area are recurrently eliminated by crumpling and overthrusting, and that the deformational patterns are primarily due to compression. The writer discusses the main deformational patterns: (1) Seismic-and-volcanic, (2) topographic-and-tectonic, and (3) geodetic-and-gravitational. The forces of compression operate in a relatively strong, brittle upper crust underlain by a zone of isostatic adjustment possessing much greater mobility. - V. S.

7092. Tiratsoo, E. A. Geology and the Search for Oil. Petroleum, London, vol. 2, 1940, No. 6, pp. 194-196, 201-204; No. 7, pp. 237-242; No. 8, 267-276. Vol. 3, 1941, No. 1, pp. 14-16; No. 2, pp. 58-60.

Discusses the following general subjects: (1) Formation of oil deposits and the exploration thereof; (2) problems of exploitation; (3) commercial production; (4) varieties of petroleum reservoirs; and (5) estimation of reserves. - V. S.

7093. Weatherby, B. B. Report of the War Efforts Advisory Committee. Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 244-252.

The War Efforts Advisory Committee of the Society of Exploration Geologists consists of B. B. Weatherby, chairman, and H. C. Cortez, R. D. Wyckoff, Herbert Hoover, Jr., W. G. Green, and F. Goldstone. The committee submitted a report of activities to the conference on maintaining geophysical operations during the war in Fort Worth, Tex., April 7, 1943. The report states that activities consisted in circulating questionnaires among geophysical organizations in regard to facilities for war work; maintaining contact with defense agencies, such as the Physicists Committee of the War Manpower Commission, Petroleum Administration for War, Petroleum Industry War Council, and this council's Manpower Committee; collecting information on the manpower situation in geophysical exploration and communicating findings to the said Manpower Committee; taking steps toward the creation of an Exploration Committee with the War Manpower Commission; and, finally, submitting to the Petroleum Administration for War a program of action for improving the manpower crisis in geophysical exploration. - V. S

7094. World Petroleum. Scientific Systems of Survey Main Reliance for Discovery. New York, vol. 14, No. 3, 1943, pp. 29, 66.

Before the start of the present war the annual estimates of United States oil reserves reached 19 billion barrels and increased steadily from year to year. However, while discoveries continued the annual additions to the reserves grew smaller. Then came the war, with its tremendous demand or oil. Since the drain on the reserves increases while their growth decreases, the available balance is falling rapidly. There is no reason or alarm, because the country's potentialities of oil have not been ex- austed, but a greater amount of exploration will be needed. Not only must more fields be discovered, but drilling must be carried to greater depths and extended to marginal or doubtful areas. Competent exploration may also discover stratigraphic traps, which are particularly profitable. The fundamental requisites for a successful campaign are a broader and more intensified employment of geological and geophysical surveys, improvement of methods and instruments, and skillful combination of all available devices and information. - V. S.

9. NEW PUBLICATIONS

7095. Bernewitz, M. W. von. Handbook for Prospectors and Operators of Small Mines, 4th ed. revised by H. C. Chellson. McGraw-Hill Book Co., New York, 547 pp., 161 figs., 1943. Price, $4.00.

In this volume H. C. Chellson, editor of Mining Congress Journal, has edited the material prepared by the last M. W. von Bernewitz for the th edition of his handbook. The edition contains five parts; a 40-page glossary of geologic and mining terms is appended. One of the previous editions was reviewed in Abs. 25, No. 197. - V. S.

7096. Billings, M. P. Structural Geology, 473 pp., 336 figs., 19 pls., New York, Prentice-Hall, Inc., 1942. Price, $4.50.

This book contains a chapter on geophysical methods. - V. S.

7097. Coast and Geodetic Survey, U. S. Department of Commerce. Progress Report on Strong-Motion Earthquake Work, April, May, June, 1943. MSP-45, Washington, D. C., 1943, 3 pp.

The following work is described: (1) San Francisco Office, questionnaire program; (2) strong-motion work; (3) vibration work; (4) principal earthquakes; and (5) Washington office. - V. S.

098. Earthquake Notes, A. K. Ludy, Editor, vol. 14, No. 3/4, 10 pp.: Seismol. Soc. America, Eastern Section, Washington, D. C., 1943.

This issue contains the following notes: (1) Uses of seismology in geological studies; (2) Cuscatlan bridge in El Salvador; (3) the Turkish earthquakes; (4) New Zealand earthquakes; (5) photo-developing problems; (6) new volcano in Mexico; (7) seismograph for Mexico; (8) local earthquakes recorded in Missouri; (9) the Fordham records of the Ecuador earthquakes, May 14 to July 12, 1942; and (10) notes of interest. - V. S.

7099. Roberts, J. K. Annotated Geological Bibliography of Virginia, 726 pp.; Charlottesville, Va., Alderman Library, 1942. Price, $4.00.

This bibliography lists all publications that had appeared before the end of 1940 on the geology in one of the older States. More than 2,500 entries are abstracted, most of them in comprehensive fashion and with author's comment. A statistical summary of the mineral resources of Virginia is included. A full index facilitates reference to subjects and authors. - C. R. Longwell, Mines Mag., vol. 33, No. 6, 1943, p. 329; - Condensed by V. S.

10. PATENTS

7100. Automatic Amplitude Control System; Herbert Hoover, Jr., Sierra Madre, Calif., assignor to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California. U. S. Patent 2,307,790, issued January 12, 1943.

In an amplifier having an input and an output, band pass filtering means connected intermediate said input and said output designed to pass waves lying within an extended frequency range, an automatic amplitude-control circuit responsive to output signals and adapted to produce gain-control voltages having an alternating-current component superimposed on a direct-current component, said component having a frequency lying in said range, and a circuit connected to apply said gain-control voltages to a gain-control element in said amplifier preceding said filtering means to vary the gain of said amplifier as an inverse function of the output-signal strength, said circuit including means providing a negative feedback connection for waves of a frequency lying in a portion of said extended range at the low-frequency and thereof while simultaneously acting as a filter which attenuates any component of a frequency in the remaining portion of said range regardless of phase shift in said remaining portion to such a degree that the all-around gain through the amplifier and automatic volume-control circuit lies below the point of regenerative instability in said remaining portion. - Claims allowed, 6.

101. Rotating Contact Device; Cecil J. Haynes, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,307,887, issued January 12, 1943.

A borehole electrode adapted to be attached to the end of an electrical ble for longitudinal movement along a borehole comprising telescoping embers, a pair of leaf springs having each end attached to a separate unit said telescoping members and their central portion spaced away from id telescoping members, a toothed disk mounted on the central portion of ch spring for rotation along the lognitudinal axis of the borehole in which id electrode is placed. - Claims allowed, 2.

102. Operations in Boreholes; Lynn G. Howell, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,308,176, issued January 12, 1943.

In an operation conducted in a borehole in which at least two extra- eous materials are placed in the borehole and it is desired to determine e position which such materials assume in the borehole, the steps of dding to each such material before introducing it into the borehole a dioactive material of relatively short life, the life of said radioactive aterial being different for each such extraneous material, placing said aterials in the borehole, producing a radioactive well log of said borehole uring the life of the shortest lived radioactive material, and producing a econd radioactive log of said borehole after the termination of the life of e shortest lived radioactive material whereby the location of the extra- eous material containing the shortest lived radioactive material can be etermined by comparison of said logs. - Claims allowed, 2.

103. Method and Apparatus for Measuring and Recording Vibrational Effects; William Robertson Welty, San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,309,560, issued January 26, 1943.

In apparatus for integrating and recording pulsating current, the ombination with a transformer to which the current is fed, thermionic alves in push-pull relation, means delivering the output energy of said ransformer to the control grids of said valves in opposed phase, a galva- ometer having the winding terminals thereof connected to the respective nodes of said valves, and a condenser and resistor arranged to shunt cross said terminals, the value of the condenser impedance being suffi- iently low as compared with the value of the resistor, the impedance of the values, and the galvanometer winding to effect approximate integration of the initial pulsating current. - Claims allowed, 3.

7104. Transducer; Josephus O. Parr, Jr., San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,311,079, issued February 16, 1943.

A magnetic seismometer including, in combination, a cylindrical, tubular casing of magnetic material, a pole piece at and magnetically associated with each end of the casing, a steady mass of magnetic material spring-supported from and in said casing for relative axial movement in respect to said pole pieces, a permanent magnet intermediate the ends of the casing and extending from the same toward the steady mass to provide and energize two parallel magnetic circuits the reluctances of which are inversely varied by said relative movement, a pair of similar coils fixed in said casing and each adapted to generate a voltage when linked by changing magnetic flux in one of said circuits resulting from such relative movement, said coils being so wound and connected together as to add the generated signal voltages, said connection being such as to cause voltage generated in the coils by stray fields to oppose and cancel each other. - Claims allowed, 12.

7105. Apparatus for Measuring Gravity; Gunnar Nørgaard, Copenhagen-Kastrup, Denmark, assignor to Aktiebolaget Elektrisk Malmletning, Stockholm, Sweden, a company of Sweden. U. S. Patent 2,311,771, issued February 23, 1943.

In an apparatus for measuring gravity, the combination of a base, two pairs of substantially vertical filaments of resilient material connected at their lower ends to said base, the filaments of each pair converging towards their upper ends and being connected to one another at said ends, the distance between said two pairs of filaments at their upper ends being different from the distance between said pairs of filaments at their lower ends, a vessel surrounding said base and said filaments, a liquid in said vessel in which said base and said filaments are immersed, and means for observing the relative position of the upper ends of said filaments. - Claims allowed, 7.

7106. Resistance Thermometer; Whitman D. Mounce, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,315,127, issued March 30, 1943.

An electrical circuit adapted to be lowered into a borehole filled
th a drilling fluid at the end of a conductor cable and including a con-
ctive element exposed to the fluid in the borehole and adapted to
spond to temperature changes in said fluid, means for supplying
ernating current to said conductive element and means for converting
e changes in said alternating current due to changes in the temperature
said exposed conductive element into direct current voltages whereby
e latter may be transmitted to the surface by the same means which
rries the alternating current from the surface. - Claims allowed, 6.

07. Well-Surveying Method and Apparatus; S. A. Scherbatskoy, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,315,355, issued March 30, 1943.

A method of geophysical prospecting that comprises lowering a
tector of radioactivity into a drill hole through the stem of the drill
ing used to drill the hole, and simultaneously continously recording
e radioactivity of formations surrounding the drill stem as an indication
their nature. - Claims allowed, 4.

08. Borehole Thermometer; W. J. Crites, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,315,840, issued April 6, 1943.

A temperature gage to record the variation in temperature in a well
re comprising a housing, thermally responsive means comprising an
pansion fluid container responsive to temperature conditions in the well
re, said container assuming the shape of a collapsed sphere with the
llapsed surfaces coming in close proximity with each other, the collapsed
rfaces being responsive to the expansion and contraction of the fluid medi-
n due to temperature change, coupling means mounted on the container for
ansmitting movement, a clock mechanism mounted in the housing having a
aft rotated by said mechanism, a record cylinder attached to the shaft,
d a stylus carried by the coupling means on the container and movable
erewith bearing against the recording cylinder. - Claims allowed, 1.

09. Addition Agent for Enhancement of the Properties of Drilling Muds; Milton Williams, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,315,995, issued April 6, 1943.

A water-soluble glass which is a shock-chilled anhydrous glassy melt of an alkali metal phosphate homogeneously associated with an oxygen-containing compound, of a normally solid element other than phosphorus, of groups 2-8 of the periodic system having a normally solid oxide, the content of said element, in terms of its oxide, in said glass being at least 1 percent by weight, said glass having a more permanent deflocculating and viscosity-reducing effect upon a solid aqueous suspension than an equal quantity of sodium hexametaphosphate. - Claims allowed, 7.

7110. Method and Means for Taking Cores; Benjamin W. Sewell, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,316,024, issued April 6, 1943.

A device for obtaining cores comprising, in combination, a body adapted for longitudinal movement in a drill stem provided with a passage arranged for containing the solid mineral portion of said core open at the bottom for receiving said core, means in the lower end of said body, for retaining a core in said passage without closing the entrance to the passage, and a transparent cylinder arranged in said body having its lower end in fluid communication with said passage, and its upper end provided with a closure. - Claims allowed, 6.

7111. Apparatus for Taking Samples of Fluid from Wells; Alvin M. Bandy, Ganado, Tex. U. S. Patent 2,316,216, issued April 13, 1943.

In a sample taking device having a sample chamber and provided with a channel entering said chamber; a tubular probe through which said channel extends and having a tapered lower end adapted to penetrate into the earth stratum to be tested and to form a seal therewith, an annular downwardly directed edge around the probe above the tapered lower end thereof and a tubular screen in the probe across said channel. - Claims allowed, 2.

7112. Subsurface Prospecting; D. G. C. Hare, Houston, Tex., assignor to Texaco Development Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,316,329, issued April 13, 1943.

In the process of investigating the formations surrounding a borehole in which a source of neutrons is passed through the hole, the neutrons penetrating the formations and certain of these neutrons being scattered in the formations, slowed down and returned to a detector disposed near the source, the method of increasing the number, energy, and speed of the neutrons entering the formations which comprises mixing with the material

omprising the source of neutrons a substance in which nuclear fission can
e produced with attendant liberation of neutrons so that, due to the bom-
ardment of said substance by the neutrons from said source, nuclear
ssions will take place whereby the neutrons leaving the mixture will be
reater in number and will have a higher energy and speed than would be
e case if the neutron source alone were used. - Claims allowed, 4.

113. Method and Apparatus for Surveying Wells; R. G. Piety, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,316,361, issued April 13, 1943.

The method of determining the distribution of radioactive materials
the earth surrounding a borehole comprising placing in the borehole a
irectional detector responsive to radioactive radiations, and observing the
irection and response of said detector with respect to a reference point on
magnetic compass. - Claims allowed, 16.

114. Well-Surveying Method and Apparatus; R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,316,576, issued April 13, 1943.

In a geophysical prospecting device, the improvements including an
ectrical circuit that comprises an electrical bridge, an ionization chamber
cluded in one leg of said bridge, a condenser included in an adjacent leg
f said bridge, resistances included in each of the other legs of said bridge,
source of electrical potential connected diagonally across said bridge in
e direction, a fixed impedance connected diagonally across said bridge in
e other direction, and a measuring instrument connected across said
xed impedance. - Claims allowed, 6.

115. Gun Perforator; R. R. Thompson and W. D. Mounce, Houston, Tex., assignors to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,316,728, issued April 13, 1943.

A well-borehole gun barrel comprising a metal body having an
longated recess therein having a sealed inner end, a projectile fitted into
e open end of said recess, a powder charge compressed in situ in the
ner end of said recess by said projectile, said projectile being of a size
make a snug fit with said barrel, and the compression pressure being of
e order of that required to compress the powder in finely divided form to
alf its original volume, and a firing element in said power charge. - Claims
llowed, 5.

7116. Apparatus for Measuring Temperatures in Boreholes; H. G. Doll, Houston, Tex., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,316,942, issued April 20, 1943.

Apparatus for obtaining indications of temperatures in a borehole, comprising a temperature-responsive resistance element lowered into the borehole, an electrical network connected to said resistance element and forming a Wheatstone bridge having at least four apices, at least one of which is disposed in the borehole with said resistance element and is connected to ground therein, a source of electrical energy at the surface of the earth, an electrical circuit connecting said source to the apex of the bridge opposite said ground point at the surface of the earth, electrical indicating means at the surface of the earth, and a second electrical circuit connecting said indicating means to the other two opposite apices of the bridge. - Claims allowed, 8.

7117. Device for Determining the Strata Traversed by Drill Holes; H. G. Doll, Paris, France, assignor, by mesne assignments, to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,317,259, issued April 20, 1943.

A device for the determination of the strata traversed by a drill hole, comprising an electrode placed inside the drill hole, means for sending an electric current between this electrode and a reference point, a second electrode placed at a slight distance from the first electrode and connected by an insulated conductor to an apparatus for measuring potential differences placed at the surface of the ground and whose other terminal is earthed, and a third electrode placed at a distance from the first electrode greater than the distance separating the first two electrodes and also connected by an insulated conductor to another apparatus for measuring the potential differences and whose other terminal is earthed. - Claims allowed, 3.

7118. Apparatus for the Electrical Surveying of Boreholes; Conrad Schlumberger, Paris, France; Anne M. L. Doll, Administratrix of said Conrad Schlumberger, Deceased, assignor, by mesne assignments, to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,317,304, issued April 20, 1943.

A device for measuring in a borehole filled with liquid the electrical resistivity of the formations traversed by said borehole, said device comprising a source of current adapted to be lowered into said borehole in the neighborhood of the formation to be surveyed, two electrodes adapted to be ubmerged in said liquid and connected to the terminals of the source of urrent, and means for measuring the differences of potential created in e formations by said source of current. - Claims allowed, 29.

119. Master Control for Electric Seismographs; E. J. Shimek, Dallas, Tex., assignor, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,317,334, issued April 20, 1943.

An apparatus for recording seismic waves comrpising in combination, eans forming a conventional spread for detecting said waves by generating ectrical signals corresponding to them, means for amplifying and recording aid signals in coordination with time, an additional detecting means adapted be positioned adjacent the shot point for detecting waves that have traveled ertically upward from their point of creation, means for connecting said dditional detecting means to amplifying means common to one of the first entioned detecting means, a gain control for controlling the gain in mplification imparted to the signals by said amplifier, common means for endering the additional detecting means inoperative and for initiating the peration of the gain control a predetermined time after the creation of the eismic waves, said gain control comprising for reducing the gain in amplication after signals corresponding to detected direct traveling waves have een amplified and recorded, means for thereafter increasing the gain in mplification at a predetermined rate through a predetermined period of time, nd means for accelerating the rate of increase of the gain in amplification roughout the period of time while the remainder of the record is being ecorded, whereby signals corresponding to direct traveling waves are ecorded with maximum gain in amplification and signals corresponding to etected reflected waves are recorded with substantially equal amplitude. Claims allowed, 4.

120. Well Surveying Instrument; G. L. Kothny, Strafford, Pa., assignor to Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U. S. Patent 2,317,386, issued April 27, 1943.

A well-surveying instrument comprising a casing adapted to enter borehole, means for supporting a record member within said casing, eans, comprising an electrical circuit, for effecting marking of said ecord member in accordance with the position of said casing, and means or controlling flow of current in said circuit, said means comprising a attery, and a circuit for drawing heavy currents from said battery so that e current falls off rapidly thereby to effect a controlling action. - Claims llowed, 6.

7121. Means for Surveying Well Bores; L. C. Miller, Dallas, Tex., assignor, by direct and mesne assignments, of One-Half to Eastman Oil Well Survey Co., Dallas, Tex., a corporation of Delaware, and One-Half to Eastman Oil Well Survey Corporation, Long Beach, Calif., a corporation of California. U. S. Patent 2,317,632, issued April 27, 1943.

An apparatus for surveying a borehole including, an instrument adapted to be lowered into the borehole, said instrument including a casing, rotatable contact arms mounted within the casing and movable to various circumferential positions therein, a compass unit associated with one of the contact arms for maintaining said arm in a predetermined azimuthal position, means responsive to inclination from the vertical associated with the other contact arms to move said arms into positions in accordance with the direction and degree of inclination of the casing, a single rotatable circuit closing element adapted to engage the various contact arms, each such engagement closing an electrical circuit, and means within the casing actuated by the engagement of the element with the contact arms for transmitting electrical impulses to the surface, said impulses being indicative of the circumferential positions of the contact arms and representative of the direction and degree of inclination of the borehole. - Claims allowed, 22.

7122. Well Surveying Device; G. L. Kothny, Strafford, Pa., assignor to Sperry-Sun Well Surveying Company, Philadelphia, Pa., a corporation of Delaware. U. S. Patent 2,318,612, issued May 11, 1943.

An electrical timing means comprising a plurality of chambers, means for controlling flow of electrically conductive liquid from one chamber to another, the latter chamber having internal conductive walls adapted to make electrical contact with said liquid, and electrode means arranged in the latter chamber to be electrically connected by said liquid after occurrence of a predetermined flow, and to be disconnected electrically after occurrence of a further predetermined flow. - Claims allowed, 2.

7123. Magnetic Permeability Indicator; W. A. Bruce, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,318,666, issued May 11, 1943.

A hand device for testing welds, comprising a pair of concentric tubular members, a head on said members having a metal surface adapted to be placed against the weld to be tested, a well in said head member in alinement with said inner tubular member, a soft iron core slidably mounted in said inner tubular member and extending into said well, a spring normally holding he end of said core spaced from the end of said well, a coil for magnetizing aid core arranged around said inner tubular member, a signaling means rranged in said casing, an electrical circuit for operating said means, and switch in said circuit adapted to be operated by movement of said magnetic lement into said well. - Claims allowed, 1.

124. Tracing Gas through Underground Formations; L. R. Hodell and J. J. Heigl, Tulsa, Okla., assignors to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,318,689, issued May 11, 1943.

In the process of producing fluids from an underground reservoir, the teps of injecting a gas into the reservoir at a plurality of points, adding a ifferent gaseous tracing agent to the gas injected at each separate point, roducing the reservoir from a plurality of points substantial distances from he points of injecting gas in said reservoir, and analyzing the production for he presence of each of said tracing agents. - Claims allowed, 1.

125. Magnetic Permeability Indicator; B. W. Sewell, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,318,720, issued May 11, 1943.

A hand device for testing welds comprising a tubular casing, a permanent nagnet mounted in said casing, an outlet for the flux of said magnet extending rom one end of said casing to one pole of said magnet and adapted to be placed gainst the weld to be tested, a signaling device mounted within said casing, n electrical circuit for operating and signaling device, and a switch in said ircuit including a spring arm adapted to be held in closed position by said nagnet and to open upon the leakage of magnetic flux from said magnet. Claims allowed, 4.

126. Seismograph Amplifier System; L. J. Peters, Tulsa, Okla., assignor to Gulf Research & Development Company, Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,318,795, issued May 11, 1943.

In combination, means for detecting a vibratory disturbance, means or amplifying the impulses from said detecting means for recording the mplified impulses, and means actuated by said first mentioned means for ontrolling the amplification ratio of said amplifier means at such a rate hat all phases of the record are of usable amplitude. - Claims allowed, 12.

7127. Geochemical Prospecting; Leo Horvitz, Houston, Tex., assignor to Esme E. Rosaire, Houston, Tex. U. S. Patent 2,319,734, issued May 18, 1943.

In a method of prospecting for petroliferous deposits in which samples of soil are collected in the area to be investigated and are analyzed for a constituent indicative of the presence of oil in a subterranean formation in said area, the step of determining the relative amounts of fine and coarse material in the soil samples, whereby the ratio of these materials may be utilized in the interpretation of the results. - Claims allowed, 3.

7128. Method and Apparatus for Geoelectrical Exploration; S. J. G. Pirson, State College, Pa., assignor of One-Half to Shelley Krasnow, County of New York, N Y. U. S. Patent 2,319,764, issued May 18, 1943.

In a method of determining underground structure the improvement which comprises causing an electric surge to travel through the earth between spaced electrodes embedded in the surface of the earth and receiving the electric impulses reflected by the geologic strata upon an electric circuit in which there is a suitable indicating instrument, the duration being such that said electric surge terminates before said reflected electric impulses are received. - Claims allowed, 31.

7129. Method for Seismic Surveying; E. J. Shimek, Dallas, Tex., assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,320,248, issued May 25, 1943.

In a method of seismic prospecting that comprises creating seismic waves in the earth's surface, detecting the waves after reflection from the interfaces of the substrata by generating corresponding electrical signals and recording the electrical signals in coordination with time that comprises creating seismic waves in the earth's surface by delivering mechanical impulses to the earth's surface at a rate that will produce signals having frequencies falling within predetermined narrow wave bands, selectively detecting said signals, electrically integrating the detected signals, and recording the resultant signal in coordination with time. - Claims allowed, 2.

7130. Geochemical Prospecting; T. H. Dunn, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,320,577, issued June 1, 1943.

In the art of exploration for underground hydrocarbon deposits, the steps which comprise systematically collecting a series of samples of urface soil at spaced locations, extracting said samples separately with n organic solvent for solid, petroleum-derived constituents present itially in said samples in soluble form, evaporating said organic solvent rom each of said extracts, and weighing the residual solid, petroleum-erived constituents, whereby valuable information is obtained concerning he location of said underground hydrocarbon deposits. - Claims allowed, 8.

131. Improvements in Geophysical Instruments; Bolidens Gruvaktiebolag, of Stockholm, Sweden, a Swedish company. British Patent 550,470, issued January 8, 1943.

Gravimeters, seismographs, geophones, magnetometers and other nstruments for geophysical researches comprising a body movable in a redetermined direction or about a predetermined axis the said body being ubjected to the influence of gravity or another field of force and wherein he effect of the weight of the body or that force on the body has been ounterbalanced by forces such as spring devices or in any other manner, haracterized by the movable body being subjected to the action of one orce or two oppositely directed compression forces of the same size cting substantially perpendicularly to the direction in which the body is ree to move. - Claims allowed, 7.

132. Improved Gravimeter; Bolidens Gruvaktiebolag, of Stockholm, Sweden, a Swedish company. British Patent 551,917, issued March 16, 1943.

Apparatus for measuring the force of gravity or variations in the ame, with the aid of a movable body, the weight of which has been counter-alanced or biased for instance by means of a spring device, the said movable ody having plates or surfaces which are separated from stationary surfaces y small gaps the variations in the width of one of which influence an electric r magnetic field, the strength of which is measured by suitable means and erves as a measure of the magnitude of the force of gravity, characterized y the feature that the movable body is provided with two or more surfaces r plates which are positioned at the same (or nearly the same) small istance from two or more stationary surfaces or plates, whereby two or ore narrow gaps are formed between the said plates or surfaces of the ovable body and the said stationary surfaces or plates, one of the said gaps ontrolling (or forming part of) the electric or magnetic field the strength f which serves as a measure of the magnitude of the force of gravity, while he other gap or gaps serve exclusively in combination with the first gap to ontrol symmetrical damping of the movable body. - Claims allowed, 3.

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I. C. 7273

MARCH 1944

UNITED STATES
DEPARTMENT OF THE INTERIOR
HAROLD L. ICKES, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 115

OCTOBER-DECEMBER 1943

COMPILED BY

W. AYVAZOGLOU AND V. SKITSKY

C. 7273,
arch 1944.

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NITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 115
OCTOBER - DECEMBER 1943[1]

Compiled by W. Ayvazoglou[2] and V. Skitsky[2]

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Geophysical Abstracts 1 - 86 were issued in mimeographed form y the Bureau of Mines; Abstracts 87 - 111 were published in bulletins of e Geological Survey; Abstracts 112 - 114 were issued by the Bureau of ines as Informations Circulars 7256, 7257 and 7267.

RRATA: In Geophysical Abstracts 113, April - June 1943, p. 7, No. 6903, line 10, insert after "The case of an oscillator" the words "subjected to arbitrary ground motion is the same as that of an oscillator" ....

In Geophysical Abstracts 114, July-September 1943, p. 21, No. 7058, lines 1-2, change "... permeability of pressure" to ".... permeability or pressure."

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7273."

[2] Senior translator, Bureau of Mines.

1. GRAVITATIONAL METHODS

7133. Clewell, D. H. The Gravimeter. Proc. and Trans. Texas Acad. Science 1941, Austin, Tex., vol. 25, 1942, pp. 86-88.

Static gravimeters, unastatized and astatized, are considered to be the most practical for oil exploration. One gravimeter is described using a beam whose moment about a pivotal axis is elastically balanced. Magnetic or electric fields are deemed unsatisfactory for balancing gravitational force because they cannot easily be kept constant. The gravimeter described is capable of detecting a change in altitude of 3 inches and a change in latitude of about 150 feet. - V. S.

7134. Gunn, Ross. A Quantitative Evaluation of the Influence of the Lithosphere on the Anomalies of Gravity. Jour. Franklin Inst., Lancaster, Pa., vol. 236, No. 1, 1943, pp. 47-65.

A quantitative investigation is made of the influence of a strong elastic lithosphere on departures from isostasy. Isostasy is shown to be a special case of a more general principle that may be called the principle of isobaric equilibrium. This principle, which expresses the condition for vertical equilibrium, is formulated quantitatively both in terms of the resultant vertical stresses in the lithosphere and in terms of measurable gravity anomalies. Employing the principle, a stress function may be determined that permits an estimate of the fraction of the uniform superposed load carried by the lithosphere. By applying this method, it is found that for the central region of a block to be in substantial isostatic adjustment (96 per cent), the linear dimension of the load must approximate 330 km., a value more than six times that often assumed. The basic constant characterizing the elastic deformations of the lithosphere is determined by appeal to geological data from deltas and regions near a thrust fault. The values so obtained suggest a value of 50 ± 15 km. for the effective thickness of the lithosphere. The deformed figures of the lithosphere for certain special types of load have been worked out, together with the stress function that measures both the gravity anomaly and the resultant vertical stress. - Author's abs.

7135. Gunn, Ross. A Quantitative Study of Isobaric Equilibrium and Gravity Anomalies in the Hawaiian Islands. Jour. Franklin Inst., Lancaster, Pa., vol. 236, No. 4, 1943, pp. 373-390

The deformation of a strong elastic lithosphere supported by an nderlying weak magma is calculated for a long, mountainous load. The eformations produce vertical superposed stresses in the lithosphere at contribute to the support of the mountain and distribute its weight ver a large area. Employing the principle of isobaric equilibrium, e distribution of the vertical supporting stress and the associated ravity anomalies may be determined by analysis. The results of the nalysis are applied to the Hawaiian chain, and it is shown that the calulated physical properties and gravity anomalies are remarkably like ose observed. It is inferred from the study that: (a) A strong lithophere underlies the Hawaiians, and this section is practically identical ith those underlying other regions; (b) the lithosphere will support one-ided stresses approximating 10^8 dynes/cm.^{2} for long periods of time; c) the distribution of gravity anomaly may be described quantitatively in rms of the calculated deformations; (d) the principle of isobaric equibrium is obeyed throughout the region whereas the isostatic principle is enerally violated; and (e) the distribution of compensating masses is not t all like that demanded by the principle of isostasy. It is concluded that sostasy leads to results that are clearly wrong when applied to mountains r other deformed regions. The principle of isobaric equilibrium appears, owever, to be well-established by the investigation. - Author's abs.

136. Martin, Luis. Estudios gravimetricos realizados en la Provincia de Mendoza. (Gravimetric Studies Made in the Province of Mendoza.) Bol. Info. Petrol., Buenos Aires, vol. 19, No. 215, 1942, pp. 76-77.

In 1940-41 a gravimetric survey was made in the northern part of endoza, Argentina, over 30,000 sq. km. of Quaternary deposits. A ketch map is given of the area explored. The gravimetric values were ound to depend on general regional features, such as the depth of the asement and large intrusive developments. Fifteen positive anomalies ere traced in well-defined lines. These anomalies are described. Their istribution forms several groups. The results indicate that further reearch would be profitable. - V. S.

137. Romberg, Frederick, and Barnes, V. E. The Gravitational Anomaly of the Smoothingiron Granite Mass (abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 325.

Observations of the force of gravity are made in the neighborhood f the Smoothingiron granite mass in Llano County, Tex. A clearly defied gravitational anomaly is noticed. The gravity data, when considered n the light of the available geological information, permit conclusions to e drawn concerning the shape of the granite mass.

7138. Woollard, G. P. A Transcontinental Gravitational Traverse and Its Relation to Regional Geology (abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, p. 349.

The writer established a transcontinental traverse from Morro Bay, Calif., to Sea Bright, N. J., using a Humble type X gravimeter. The results indicate that the country can be broadly divided into two parts, with the dividing line near the Kansas-Missouri border. In the eastern half no definite correlation is observed between structural geologic features except that the structural "highs" and "lows" appear to have an inverse relation to the gravity profile. An exception is the Appalachian Basin, which has a gravitational trough. In the western half of the country, from the basin and range region to the Pacific area, the gravity values tend to conform with the geologic structure. There are, however, certain anomalous areas, such as the San Joaquin Valley, where a gravitational "high" occurs in a structurally low region. The isostatic effects are for the most part small in the eastern part of the continent but extremely large in the western part. - V. S.

7139. Woollard, G. P. Transcontinental Gravitational and Magnetic Profile of North America and Its Relation to Geologic Structure. Bull. Geol. Soc. America, Washington, D. C. vol. 54, No. 6, 1943, pp. 747-790.

A series of magnetic and gravitational measurements at 7-mile intervals was made across the continent from Sea Bright, N. J., to Morro Bay, Calif. For the most part the data were complementary, indicating a common control, although this varied with the regions crossed. In the eastern half of the country lithologic variations in the basement apparently controlled; in the western part of the country, structure was reflected in the gravity values due to the large density contrast between the sediments and the crystalline and consolidated formations. The magnetic variations for the most part reflected lithology.

Large anomalies in both sets of data must originate from deep-seated sources. The marked regional effect upon which the above variations were superimposed apparently reflects in the gravity value the elevation of the stations, and the amount of the anomaly is approximately that of the isostatic correction. For the magnetic values the regional effect is believed to be primarily related to inadequate longitude correction. In general no correlation could be made between the reduced data and the large regional geologic structures. - Author's abs.

140. Wright, F.E. Gravity-Measurements in Guatemala. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 512-515.

A network of gravity stations about a volcano is desirable with a ew to determining the movement of molten rock from under the volcano, ward the surface. Since the density of the molten magma is likely to ffer from that of the surrounding rock, the approach of the magma to the urface should affect gravity values. Preliminary to establishing a net- ork of stations about the volcano, a base station should be occupied with gravity pendulum apparatus to serve as reference point for measure- ents with a gravity meter. The author made such base-station measure- ents with the Brown pendulum apparatus at Guatemala City and uezaltenango for observation of the Santa Maria Volcano; the gravity alues are given. - V. S.

2. MAGNETIC METHODS

141. Fleming, J. A., and Scott, W. E. List of Geomagnetic Observatories and Thesaurus of Values, II. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 48, No. 3, 1943, pp. 171-182.

Table 1, Annual Values of Geomagnetic Elements at Observatories, is ontinued in this issue (for the first part of this table see Geophys. Abs. 4, No. 7015). - V. S.

142. Geyer, R. A. Geomagnetic Survey of a Portion of Southeastern New York (abs.). Research Council, Am. Geophys. Union, Trans. of 1942, part II, Washington, D. C., 1942, pp. 289-290.

The area covered by this survey comprises portions of northern estchester, Putnam, and southern Dutchess Counties. Four hundred nd eighty-six stations were occupied, at which the vertical component f the earth's magnetic field was measured with an Askania magnetometer. hese data were plotted on a map on a scale of 1 : 30,000. The resulting sogam chart was superimposed upon a geologic map of the area to correlate hanges in the magnetic field with changes in the geologic characteristics. rather close correlation was shown to prevail in most instances. The rea surveyed included formations ranging in character from only slightly etamorphosed sedimentary to highly metamorphosed igneous and sedi- entary rocks. The total variation in the earth's field in this area was pproximately 4,000 gammas. - V. S.

7143. Johnston, H. F. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for April to June, 1943. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol, 48, No. 3, 1943, pp. 133-136.

Tables of indices are given. The American magnetic character-figure C_A is based upon the reports of the seven American-operated observatories. The 3 hour-range indices K are compiled separately for each of these observatories; the indices range from “zero” (very quiet) to “9” (extremely disturbed). - V.S.

7144. Knapp, D. G., and Howe, H. H. Magnetic Observatory Results at Tucson, Ariz. for 1931-32. U. S. Coast and Geodetic Survey, Washington, D. C., MC-12, 1942, 118 pp.

This publication contains 108 tables of observatory results and an explanatory text. The tables give extreme and mean temperatures, observed and adopted values H, Z, D, abrupt changes, noncyclic changes, summaries of monthly and annual means, principal magnetic disturbances, etc. The text covers the work in several allied fields (seismology, atmospheric electricity, earth currents), description of instruments, constants of the magnetograph, absolute observations and base-line values, explanations of tables, etc. - V. S.

7145. Lasareff, P. P. Études des variations séculaires du magnétisme terrestre. II. Les Variations séculaires et les anomalies magnétiques locales. (Studies of Secular Variations of Terrestrial Magnetism. II. Secular Variations and Local Magnetic Anomalies.) Compt. rend. (Doklady) Acad. Sciences U. R. S. S., Moscow, new ser., vol. 27, No. 9, 1940, pp. 937-939.

Direct observations of secular geomagnetic variations and previous results of mathematical formules deduced for them are compared (see Abs. 114, No. 7022). For Paris, where magnetic declinations have been measured since about 1540, the agreement between observed and computed secular amplitudes is very satisfactory. Certain discrepancies are found, though, which will be discussed in forthcoming papers. Equations are further evolved for isolines and isopores. The isopore equations furnish a basis for conclusions. If the field of terrestrial magnetism is differentiated into a variable field of the earth’s interior, producing secular variations, and an invariable field of the earth’s crust, then the mathematical deductions agree with empirical observations only for a given moment. Any change of the field with time, characterized by isopores, brings about deviations rom observation. Therefore, it must be concluded that the magnetization f the earth's crust producing the abnormal field is in part dependent on me. - V. S.

46. McNish, A. G. Geomagnetic Survey of the Volcanic Areas of Guatemala. Nat. Research Council, Am. Geophys. Union, Trans. 1941, part II, Washington, D. C. 1941, pp. 508-512.

The vertical component of the earth's magnetism was surveyed the vicinity of the Santa Maria Volcano, Guatemala. It revealed low alues in localities where volcanic activity is evident. The hypothesis as thereby confirmed that the volcanic rift is underlain by vast bodies f hot rock. The evidence also indicated an extension of the effect of the olcanic region far beyond the rift. Additional work showed that, as the ft is approached from the high inland plateau, vertical intensity decreases t a greater rate than would be due to change in latitude. After dipping harply to the low values of the rift, vertical intensity rises to a maximum s the coastal plain is approached. The subsequent drop over the coastal lain is greater than would be produced by the latitude effect. The average ertical intensity on the coastal plain is nearly 2,000 gammas higher than on he inland plateau, although it should be several hundred gammas lower ecause of the difference in latitude. The writer concludes that, on a world cale, a considerable difference in magnetic values assigned to Guatemala ould arise according to whether observations were made inland or on the oast, though either region would appear undisturbed. - V. S.

47. Nettleton, L. L., and Elkins, T. A. Association of Magnetic and Density Contrasts with Igneous Rock Classifications (abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 328.

The frequent coexistence of strong magnetic and gravity anomalies irects attention to the properties of igneous rocks which may account r them. Density data are direct and unambiguous, but magnetic data are uch less certain. On the assumption that it is determined by disseminated agnetite, the susceptibility can be estimated from the proportion of magetite in the rock. The possibility of estimating magnetite content from hemical analyses is examined, and while not very satisfactory it probably ives relative values of some merit. From published chemical analyses e magnetite content and probable intensity of magnetization are calcuted for some 1,450 samples of igneous rocks, for which density values re also given. The values and resulting contrasts are analyzed statiscally and tabulated for the C.I.P.W. and the Iddings method of classification.

The contrasts, thus determined, are in reasonable agreement with expectations from the analysis of magnetometer and gravimeter surveys.

7148. Stephenson, E. L. Geophysical Surveys in the Ochoco Quicksilver District, Oregon; a Preliminary Report. Geol. Survey, Washington D. C., Bull. 940-C, 1943, 98 pp.

Three geophysical surveys were made in 1941 in the Ochoco quicksilver district, Oregon, by the Section of Geophysics, Federal Geological Survey, in cooperation with the Oregon Deaprtment of Geology and Mineral Industries. The primary purpose was to determine the value of magnetic and electrical measurements for assisting mine development. Becuase of the physical nature of cinnabar and the small size of the ore bodies, finding deposits required delineation of geological structures associated with the ore. Many of the rocks in the Ochoco district are paramagnetic. Accordingly, the mapping of the ore-bearing fault systems was based upon detailed magnetometric surveys, supplemented by resistivity measurements. It was found that the surveyed areas are magnetically variable and possess many anomalies. Some anomalies appear to depend on differences in type of rock; but other magnetic patterns are determined by the fault systems. The geophysical surveys resulted in concrete suggestions for further prospecting. The report is illustrated by magnetic and topographic maps and resistivity profiles. - V. S.

7149. Sucksdorff, E. Die erdmagnetische Aktivität in Sodankylä in den Jahren 1914-34 (Terrestrial Mangetic Activity at Sodankylä in the Years 1914-34). Veröffentlichungen des geophysikalischen Observatoriums der finnischen Akademie der Wissenschaften, Kuopio, No. 25, 1942, 68 pp.

The Sodankylä Observatory made observations during 1914-34 in the vicinity of the auroral zone. The hourly variation of the vertical component of the earth's field, minus the amount attributable to its regular diurnal variation, was taken as the measure AZ of magnetic activity. The mean activity observed in the period under consideration was: AZ = 131. The most active year was 1930: AZ = 244; the least active years were 1914 and 1921: AZ = 64 and AZ = 62. The yearly curve of geomagnetic activity consisted of two 6-month waves; the maxima fell on March and October, the minima on July and near December. The daily curve of activity was represented by a single regular wave, with the maximum shortly before local midnight and the minimum a little before noon. The Sodankylä results likewise cover other aspects of geomagnetic activity. - H. D. Harradon, Terrestrial Magnetism and Atmospheric Electricity, vol. 48, No. 2, 1943, pp. 113-114; condensed by V. S.

150. Vestine, E. H. The Reduction of Magnetic Observations to Mean of Year (abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, p. 441.

Measurements of the earth's main field are affected by continuously rying electric currents flowing above and below the earth's surface. The ture of the monthly and daily variations in these measurements has been udied for the Polar Year 1932-33. The monthly mean departures from nual mean values at magnetic observatories vary in a systematic way with e position on the earth. Changes with position depend in a marked way on geomagnetic latitude. The departures show a field symmetrical about e geomagnetic axis and equator, upon which is superposed a similar field pending locally in intensity on the season of the year. The daily mean partures from monthly mean values give rise to a world field of a neral type similar to that of the monthly departures from the annual ean. - V. S.

51. Wasserfall, K. F. Periodic Changes in $\triangle$ D at Oslo, 1843 - 1930. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 48, No. 3, 1943, pp. 145-150.

The observations of the magnetic horizontal intensity (H) at the Oslo servatory have been published previously (see Geophys. Abs. 106, No. 52). The present paper gives the mean values $\triangle$ D = (H_{14} - H_9), 1843-30, grouped according to seasons, with a discussion of possible periodic enomena. The periods of 11 years, 8 months, and 8 years in $\triangle$ D variaon are examined, in connection with corresponding variations of sunspots. tention is also given to the secular variation in $\triangle$D, and in D at 09^h. - V.S.

152. Wasserfall, K. F. Three-Hour-Range Index, K, at Dombås Observatory During 1939 to 1942. Terrestrial Magnetism and Atmospheric Electricity, Baltimore, Md., vol. 48, No. 3, 1943, pp. 151-160.

The International Association of Terrestrial Magnetism and Electriity established in September 1939 a 3-hour-range index K characterizing e variation in degree of irregular magnetic activity (storminess) throught each day. The author presents the data for index K at Dombås Observary, Bergen, Norway, 1939-42, giving annual mean values, frequency istributions, diurnal variation, relation to sunspot numbers R, recurrence f magnetic activity for each solar rotation period, etc. Domås data confirm recurrence of geophysical elements of high and low values over a solar tation period of 27 days. - V. S.

7153. Woollard, G. P. A Comparison of Two Sets of Transcontinental Magnetic Data (Abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, p. 451.

In the summer of 1940 a traverse was run by the author from Sea Bright, N. J., to Morro Bay, Calif., with the Askania Schmidt vertical-component magnetometer. For control, a line of base stations about 35 miles apart was first established across the country. Then, in making the final traverse, these bases were reoccupied with a spacing of about 5 miles between stations. A comparison of the magnetic intervals between bases on the two traverses showed throughout the same magnetic picture. Most changes were about 300 to 400 gammas in relatively undisturbed portions of the country and about 1,000 gammas in areas where igneous rocks are close the surface. The average check over the entire traverse for the base-station intervals was about 50 gammas. - V. S.

Woollard, G. P. Transcontinental Gravitational and Magnetic Profile of North America and Its Relation to Geologic Structure. See No. 7139.

3. SEISMIC METHODS

7154. Agocs, W. B. A Method of Determining the Time Break on Deep-Sea Records from the Water Sound Arrivals (abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 330.

A method is presented whereby through the use of the direct water wave first arrival, and the first and second reflections of sound from the surface of the sea, the following data may be obtained: (1) The ratio of the depth of the shot below the surface of the sea to the lateral distance between the shot and detector; (2) the lateral distance between the shot and the detector at the bottom of the sea; and finally (3) the time of detonation or the time break. Calculation of the velocity of sound in sea water shows a linear variation of the velocity in definite zones with a rather abrupt change in velocity from zone to zone, as the depth is varied. Curvature due to refraction is found to be negligible. Sample computations are given.

7155. Alcock, E. D. Selection of Computational Methods for Seismic Paths. Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 297-307.

Due to the decrease in magnitude of structures being sought in seismic exploration, the selection of the most accurate method of computation ssumes increasing significance. The underlying assumptions and haracteristics of several common computational methods are discussed, nd an analysis is made for a specific case. - Author's abs.

156. Birch, Francis. The Problem of Identifying the Crustal Layers. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 552-556.

Seismic records can be used for determining the constitution of the arth's crust down to 40 km. The method is based on the velocity of wave ropagation in different materials as affected by elasticity at high pressures nd temperatures. The existing measurements have shown that igneous rocks t high pressure are very nearly isotropic elastically; accordingly, it is ossible to calculate the velocity of the compressional wave and Poisson's atio. The author has also determined the influence of temperature on the elocity of the shear wave. These data point to small temperature effects n velocities and lead to the conclusion that velocities in any rock similar granite must be about 5.9 to 3.4 km./ sec. in the layers extending to 15 m. or more, except within a few kilometers from the surface. It may thus e surmised that the top layer in New England and the second layer in outhern California probably are not far from granite in composition. The asement complex, predominantly granitic, comes very close to the surface n New England; the bottom layer is probably olivine or dunite. - V. S.

157. Blake, Archie. The Possibility of Seismic Measurement of the Rotation of the Earth's Core. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 387-392.

In the motion of the earth the axis of rotation of the liquid core may ag behind the axis of the rock mantle, due to the slow transfer of angular omentum to the core. Inglis has estimated the angle of lag at 2°. Seis- nology should assist in the determination of this angle. The bending of the ismic rays on entering and leaving the core would be altered by the otation; moreover, the waves after penetrating the core would be carried long with it. Both these effects should change the travel time. The author resents his calculations of the magnitude of this change. The bending of he ray on entering and leaving the core is obtained by Huygens' construction. seismic wave traveling through the bottom of the mantle and the top of the ore will be refracted according to Snell's law. - V. S.

7158. Dix, C. H., and Lawlor, R. C. Computation of Seismic Dips Below Unconformity. Geophysics, Menasha, Wis., vol. 8, No. 2, 1943, pp. 105-118

Formulas giving the strike and dip of a plane reflector beneath a series of layers separated by interfaces of known strike and dip are developed in terms of seismic data obtained at the surface. The formulas for the position of a plane reflector beneath a single unconformity are also developed. Examples show the extent of the influence of the strike and dip of a single unconformity on the computation of the strike, dip, and position of the reflector yielding a given set of surface data. - Author's abs.

7159. Gould, M. J. Analysis of Various Proposed Explanations of the Ground Roll (abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 329.

The quest for deeper seismic reflections has led to instrumental perfection of such a degree that future progress will depend upon an increased knowledge of the ground motion. As a step in this direction, the author analyzes various proposed explanations of the ground roll. Consideration of gravitational waves in a viscous medium of finite depth leads to velocities too small for ground-roll wave lengths. The theory of Love waves on a visco-elastic layer overlying a visco-elastic substratum offers a possible explanation of the observed predominant ground-roll frequencies and a reduction of Love wave velocity because of the viscosity. The importance of Bateman's "secondary Rayleigh wave" cannot be known without the solution of the complex problem of the partition of energy at the source of the Rayleigh waves. An examination of seismic data on the velocity of the ground roll indicates that the observations are not necessarily inconsistent with the theory of dispersion of Rayleigh waves on a layered elastic medium, but that there may be other causes of the observed dispersion. In explaining certain unusual ground-roll velocity variations near Fresno, Calif., the theory applies rather well, although the data are not very extensive. Analysis of three-component ground-roll data leads to the required theoretical value of the ratio of major to minor axis of the retrograde particle-motion ellipse, although there also exists an anomalous initial forward cycle of particle motion.

7160. Horton, C. W. Secondary Arrivals in a Well Velocity Survey. Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 290-296

Seismograms obtained in a well survey of the Shell-Longleaf Lumber Co. #1, Vernon Parish, La., showed well-developed secondary arrivals hich satisfied a velocity formula V = (2000 + 0.27 Z) feet per second. these arrivals are assumed to be transverse waves, a value of 0.43 r Poisson's ratio is obtained. On this same assumption, values of the odulus of regidity and bulk modulus are computed for various depths. is shown that the velocity of the secondary wave does not satisfy the quation developed by Lamb for thick-walled Tuve waves, - Author's abs.

161. Lynch, W. A. Trials of Galvanometers of Various Periods with Electromagnetic Seismometers (abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, p. 407.

Galvanometers with a variety of periods have been tried with electro-agnetic seismometers to extend the usefulness of the latter. A filtering ffect is obtained by means of such a combination, so that certain earth ibrations are suppressed and others are magnified. As a result of this esearch, the usual Benioff seismometer has been equipped with a short-eriod galvanometer having a period of about a fifth of a second and with long-period galvanometer having a period of about a minute. Recording improved greatly by the use of three galvanometers: (a) The original hort-period; (b) Leeds & Northrup Type-R, with a period of 4.5 seconds; nd (c) Leeds & Northrup Type-P ballistic, with a period of 25 seconds. It as also been possible to increase the effectiveness of the Galitzin-Wilip nstruments in the same way. The microseismic disturbances on the 4.5-nd 6.5-second galvanometers have been much less than anticipated. xperiments are continuing. - V. S.

162. Neumann, Frank. The Analysis of the El Centro Record of the Imperial Valley Earthquake of May 18, 1940. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C. 1941, p. 400.

The author has analyzed the El Centro Earthquake records of May 18, 940, by converting the active portion of the three acceleration curves to elocity and displacement and constructing resultant-motion graphs for imited periods of time. From this study he draws the following conclusions: "(1) In the epicentral area the same laws of seismic wave propagation are ound as in the case of distant earthquakes, that is, the resultant ground notion is apparently a combination of longitudinal and transverse waves vhich is not seriously disturbed by the slipping motion along a nearby fault; 2) dominant periods, for the shorter period waves, are clearly in evidence nly in directions which are longitudinal and transverse with respect to the irection to the epicenter; (3) along oblique coordinates, not "square" with the epicentral direction, the longitudinal and transverse waves in the shorter-period range combine in such a complex pattern that dominant periods are practically nonexistent and the period-amplitude graphs are merely smooth curves or envelopes which embrace wide ranges of periods; (4) fairly reliable curves are now available to show, for the more complex type of record, the variations of acceleration, velocity, and displacement with period; (5) from a study of rotational characteristics of the resultant-motion graphs, it is found that rotational motions are of definite periodic (reversing) character." - V. S.

7163. Perry, E. L. The Moodus Earthquake and the Cause of Earthquakes in New England. Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, pp. 401-404.

Two earthquakes occurred at Moodus, Conn., on March 2 and 13, 1940. The instrumental data gathered by the Benioff stations at Fordham, Harvard, Weston, and Williamstown indicate that the epicenter in both cases is located at longitude 72°25.7' west and latitude 41°28.2' north. The focus must be placed in the deep crustal or subcrustal layers, possibly at a depth of about 10 miles. Records show a strong "false S" phase preceeding the probable S phase. The two shocks are typical of Moodus earthquakes in general. In regard to causes the evidence is conflicting. While the glacio-isostatic theory must be considered possible for earthquakes in the Northeastern States, the bulk of the evidence seems to point to other causes of isostatic adjustment, such as uplifted areas in the Appalachians. The only possible conclusion at present is that the region of Moodus and other Connecticut localities still plays an active role in Appalachian geology. - V.S.

7164. Randall, L. E. Geophysics in the Appalachian Area (abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 325.

The problems encountered in seismic surveying in the Appalachian area are largely the result of surface or near-surface phenomena. There is, apparently, in the local highly dissected erosional pattern a sporadic decay or loss of velocity in the rock masses situated above the lowest contact between country rock and erosional fill. For one such area the author presents maps of average-velocity isohorizon contact. He also gives a map of one area before and after the velocity correction. Attention is further called to an apparent relation between isovelocity discontinuities and faulting. - V. S.

65. Rosaire, E. E. An Analysis of the Refraction Collapse of 1930.
Tulsa Geol. Soc. Digest, Tulsa, Okla., vol. 9, 1940-41, pp. 58-59.

The author analyzes the causes of the decline of the seismic
fraction method since 1930. In the period 1924-30 this method helped
discovering nearly 50 salt domes, more than had been discovered in
e same area during the previous 20 years. But in 1930 the 22 wildcat
sts drilled on refraction anomalies gave 17 failures. Such a low
ficiency led to abandoning refraction prospecting. However, the author
cently observed a significant fact. Nearly 30 dry holes drilled on
fraction anomalies were located on the fringes of subsequently dis-
vered productive fields. This proximity points to misunderstanding of
e initial refraction data. Petroleum accumulations usually are flanked
zones of sediments characterized by seismic travel speeds higher than
rmal. These local travel-speed "highs" had been misinterpreted as
dications of structure. The error occurred because the actual structure,
rming here the fringe of a dome expanding elsewhere in the vicinity, was
eper-seated and lower in relief than established theory would lead
ospectors to suppose. - V. S.

66. Sawdon, W. A. Geophysical Activities in California. Petrol. Eng.,
Dallas, Tex., vol. 14, No. 6, 1943, p. 66.

At present most Californian geophysical work is in and around the
cramento Valley, where there have been gas discoveries but no oil finds.
ie reflection seismograph is most commonly used although there are five
avimeter parties in the field. Geophysical exploration has also pro-
essed in the Los Angeles Basin and the Santa Maria, Ventura, and San
aquin Valleys. The greatest amount of seismic reflection work was done
the San Joaquin Valley. At first large features were sought; then smaller
atures down to depths of 7000-8000 feet; and later features down to
,000 - 11,000 feet. Very careful interpretation is needed at these great
pths. - G. D. H., Jour. Inst. Petrol., vol. 29, No. 235, 1943, p. 254A;
ndensed by V. S.

67. Science. A New Seismograph in Mexico. Lancaster, Pa., vol. 97,
No. 2518, 1943, p. 303.

The State government of Puebla, Mexico, has acquired a Benioff
rtical-component seismograph, to be installed at the National Astro-
ysical Observatory at Tonantsintla. - V. S.

7168. Shugart, T. R. Frequency Discrimination in the Weathering (abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 327.

The various factors controlling the "character" of reflection seismograph records are so numerous and so complex that it is very difficult to isolate and investigate each of them experimentally. One of these factors is the frequency discrimination due to multiple reflections in the weathered layer. With a few simplifying assumptions this problem reduces to one already treated in the classical theory of accustics. It is shown that for a given weathering depth the transmission is a periodic function of frequency. The ratio of the maximum to the minimum transmission is nearly equal to the square of the ratio of the specific acoustic impedance of the unweathered to that of the weathered layer. Graphs of transmission as a function of frequency are shown for various weathering thicknesses.

7169. Stechschulte, V. C. The North Carolina Earthquake of December 25, 1940 (abs.). Nat. Research Council, Am. Geophys. Union, Trans. of 1941, part II, Washington, D. C., 1941, p. 406.

A small earthquake occurred in northwestern North Carolina about 1:47 a.m., eastern standard time, December 25, 1940. Shocks were recorded at approximately this time at Cincinnati, St. Louis, Pittsburgh, Williamstown, Weston, and Fordham, but attempts to correlate the readings suggest that the New England stations recorded a different shock occurring at nearly the same time. A number of small shocks occurred in this general region of the Appalachians in recent years.

7170. Wolf, Alfred. The Motion of a Weight on the Surface of an Elastic Earth (abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, p. 331.

The motion of a geophone case placed on the surface of an elastic solid does not follow faithfully the motion of the solid at high frequencies. This subject was discussed experimentally and theoretically. In effect, a weight placed on the surface of an elastic solid constitutes a damped oscillating system. The elastic restoring forces are determined by the area of contact between the weight and the surface of the solid and by the elastic moduli of the solid. The mass of the solid also contributes to the inertia of the system. Equations are developed for these forces on the assumption that the wave length is long compared with the linear dimensions of the area of contact between the weight and the elastic solid. This leads to a determination of the natural frequency of osscillation and of the decrement of such a system.

171. Young, W. H., Jr. Results of a Detailed Reflection Profile in New York (abs.). Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 330-331.

Of the many prospecting methods used in the New York-Pennsylvania egion the reflection seismograph has proved most successful. Still, the oundance of surface and shallow-well data in this area leads the skeptics ask: "Where has seismograph work found structure that could not have een found by other means?" The author offers examples in support of eismic surveying. Maps, cross sections, and methods of profiling are esented for an offset location in Independence Township, N. Y., with stances of structure determination proved by subsequent drilling. It is inted out further that reconnaissance work must be supplemented with etailed profiling; a close spacing of depth points is necessary in fault ofiling. - V. S.

4. ELECTRICAL METHODS

172. Bates, F. W., and Wharton, J. B., Jr. Anse La Butte Dome, St. Martin Parish, La. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 27, No. 8, 1943, pp. 1123-1156.

Anse la Butte is located on the Louisiana Gulf Coast. The dome is piercement type, with salt at a depth of 160 feet. Geophysical explo- ation contributed to its deeper flank production in 1940. The present aper reinterprets subsurface conditions in the light of recent data. These ta include electrical logs of wells in different structural positions. On e basis of these logs the oil-bearing zones have been identified at their roducing depth in regard to characteristic thickness and sand development. lustrations of type logs are presented, with generalized columnar sections formations and producing sands encountered above 5,000 feet, and with agnostic faunal zones. - V. S.

173. Doll, H. G. A Method for Determining Formation Dip and Strike in the Drill Hole (abs.). Tulsa Geol. Soc. Digest, Tulsa, Okla., vol. 11, 1942-43, p. 43.

The paper discusses a method and apparatus to determine the dip of rmations traversed by a drill hole by means of electrical measurements the hole. The process consists in recording the spontaneous potentials resent along three oriented generatrices in the hole. By comparing the ree curves thus obtained, and applying a correction factor to compensate for any deviations of the hole, the dip angle and the dip direction are determined. Excellent accuracy is obtained for dip angles over 10°. Because the method is simple and the apparatus rugged, the measurements are rapid and reliable; consequently they can be made at all the levels which are of interest at any time after the well has been drilled. Mechanical cores are not needed to evaluate the dips. A convenient, time-saving procedure is to perform the dipmeter survey at the time the electrical log is taken, using for both operations the same cable and truck. Actual examples of results obtained in wells of the Gulf area are given.

7174. Evjen, H. M. Utility of the Electric Methods in Geophysical Exploration. Geophysics, Menasha, Wis., vol. 8, No. 2, 1943, pp. 146-156.

The theoretical possibilities and the physical background of electric methods are considered in a qualitave manner. A rigorous mathematical treatment of the problem is at present a practical impossibility because the electric properties of the ground are not sufficiently well known. By analogy with the seismic method of exploration, however, where the rigorous physical optics governing the transient generated by exploding dynamite, and the propagation of said transient in general, have been sadly neglected, this lack of mathematical rigor should not be a serious stumbling block. It is concluded that the possible utility of electric methods can be best-appraised in terms of the known utility of electric well logging. This possibility, according to the author's experience, can be attained only by a departure from the traditional electric methods. One such departure is described in general terms. - Author's abs.

7175. Kornfeld, J. A. Electrical Logging Through Thick Salt Zone. Petrol. Eng., Dallas, Tex., vol. 14, No. 12, 1943, pp. 90-94.

In the shallow drilling of thick salt deposits the continuous circulation of rotary drilling mud through the saline beds has a detrimental effect on electrical logging. It minimizes the spontaneous electrical potential recorded by the log and complicates interpretation. This effect has been overcome in central Kansas by replacing the lower part of the column of salt-laden drilling fluid with fresh-water mud. The mud is pumped through the drill stem from the bottom of the hole. At the same time the recording graph should be given a wider range. The spontaneous-potential electrical curve then shows in sharper relief the porous zones and the relative values of porosity breaks. The paper gives a brief review of the theories dealing with electro-chemical properties of drilling fluids, of experimental work in the Coralena pool, Kansas, and of the field practices. - V. S.

76. Rose, N. A. Ground Water and Relation of Geology to Its Occurrence in Houston District, Texas. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 27, No. 8, 1943, pp. 1081-1101.

The Federal Geological Survey, the Texas State Board of Water ngineers, and the City of Houston began in 1930 a joint survey of the round-water supply in the Houston district. The present study of this vestigation uses the electrical logs of oil tests and water wells as a sis for subdividing into seven zones the geological formations providing e water. The formations are upper Miocene, Pliocene, and Pleistocene. he zones have been correlated along two lines. Examples of cross sections e presented, and the zones are described in the course of the study. - V. S.

77. Sawdon, W. A. Electrical Logging in Oil-Base Drilling Fluid. Petrol. Eng., Dallas, Tex., vol. 14, No. 9, 1943, pp. 124-126.

Oil does not conduct electric current. Therefore, oil-base drilling uids interfere with electrical logging. Yet, these fluids must be used in illing through low-pressure sands where loss of water into the formation detrimental. Accordingly, special instruments have been developed to ocure electric logs in holes containing oil-based fluids. One such instruent is described. It has a contact-electrode sinker adjustable to holes of fferent size. The electrode assembly includes several elliptical springs tached to collars sliding on the main stem. Each spring holds an indiidual conductor lead and a cutter penetrating the oil-mud film. The cutter made of hard metal and protrudes about 3/4 inch beyond the outer face the spring. This construction insures a sufficiently firm, sliding contact ith the face of the formations for passage of the current. Research has so been made on the optimal composition of oil-base drilling fluids. - V. S.

Stephenson, E. L. Geophysical Surveys in the Ochoco Quicksilver District, Oregon; a Preliminary Report. Geol. Survey, Washington, D. C., Bull. 940-C, 1943, 98 pp. See No. 7148.

178. Weiss, Oscar. Preliminary Observations on Apparent Electrical Resistivity Changes in Rocks under Stress and on E. M. F. Caused by Internal Friction in Rock Fracturing. Bull. Inst. Min. and Met., London, No. 462, 1943, 14 pp.

The electrical resistivity of rocks changes with an increase of hysical pressure. Each type of rock has its own variation of resistivity. rigin, structure, and past history of a rock affect its resistivity. Such is the evidence of experiments made by the author with a view to rock-burst prediction. He finds that in the process of rock fracturing the internal friction generates an electromotive force. Witwatersrand quarzites show small impulsive deflections as the load increases, with a final large drop just before the specimen collapses. Dolomites give deflections only immediately before collapse. Fine-texture mudstone has a very small deflection on collapse. A number of load-resistivity curves of different pattern are presented and analyzed. - V. S.

7179. West, S. S. The Mutual Impedance of Collinear Grounded Wires. Geophysics, Menasha, Wis., vol..8, No. 2, 1943, pp. 157-164.

The formula of R. M. Foster for the mutual impedance of grounded wires lying on the surface of the earth has been evaluated for the case where the wires are grounded at points which are collinear and equally spaced upon the surface of a homogeneous earth. Curves are given showing mutual impedance and phase shift as functions of resistivity and frequency. - Author's abs.

5. RADIOACTIVE METHODS

7180. Copp, D. H., and Greenberg, D. M. A Mica-Window Geiger Counter Tube for Measuring Soft Radiation. Rev. Sci. Instruments, Lancaster, Pa., vol. 14, No. 7, 1943, pp. 205-206.

A mica-window Geiger counter tube is described which combines the speed of a metal-walled tube with a sensitivity to soft radiations comparable to that of the screen-walled tubes. It consists of a NO_2-treated metal cylinder covered at one end by a thin sheet of mica (0.02 mm.) and at the other end by a glass bell with a central capillary. Through this capillary is sealed a piece of 8-mil tungsten wire with a drop of glass fused over the end. The tube is operated at a pressure of 10 cm. of Hg with a mixture of 10 percent ethanol and 90 percent argon. - Author's abs.

7181. De Luca Muro, F. P. Investigacione radioactivas y mejoras en los metodos de perfilaje. (Radioactive Investigations and Improvements in Methods of Logging.) Bol. Inf. Petról., Buenos Aires, vol. 20, No. 223, 1943, pp. 43-47

The author briefly discusses radioactivity in rocks, α, β, and γ rays, radioactive methods of logging, and the necessary apparatus. Examples

logs in the Rio Pescado Valley are presented; comparison is made
tween radioactive and electrical logs. The Geiger-Müller counter is
tlined. There is a discussion of Amtronn's method and apparatus for
asuring the ionization of the emanation content of soil gases character-
ng the radium potency of upper earth formations (for details of this
thod see R. Ambronn, Elements of Geophysics, New York, McGraw-
l Co., 1928, pp. 118-120). - V. S.

82. Hurley, P. M., and Goodman, Clark. Helium-Age Measurement. I. Preliminary Magnetite Index. Bull. Geol. Soc. America, Washington, D. C., vol. 54, No. 3, 1943, pp. 305-324.

Helium age measurements on magnetite specimens of various
ological ages show a grouping and sequence in accordance with geologi-
l knowledge and a spacing compatible with ideas derived from sedimen-
tional history. Ages in millions of years are given as follows: Mean
ocene, 19; mean Laramide, 57; mean Nevadan, 118; mean late Triassic,
5; mean late Appalachian, 215; mean Devonian, 348; pre-Cambrian,
nging from 500 to 16,500. As a result the scale is considered suitable as
index for preliminary investigation of the helium retentivity of minerals
d application of the method to igneous rocks. - Authors' abs.

83. Keevil, N. B. Helium Indexes for Several Minerals and Rocks. Am. Jour. Science, New Haven. Conn., vol. 241, No. 11, 1943, pp. 680-693.

Helium indexes of a series of crystalline basic rocks are found to
fairly consistent with expected geological sequence, probably because of
e high helium retentativities of the mafic constituents. Results for pre-
d post-ore dikes in southern Quebec and Newfoundland suggest contempo-
neous mineralization in these two widely separated deposits. Poor results
re obtained with minerals at Franklin, N. J., possibly due to their complex
ological history, but on the average the results agree with geological
dications of a late pre-Cambrian age. Variable results were obtained with
her minerals, including magnetite, and some of these are ascribed to
ystal imperfections. As noted previously, rocks having glassy ground
asses are of no use in geological correlation by the helium method.
uthor's abs.

184. Keevil, N. B., Keevil, A. R., Ingham, W. N., and Crombie, G. P. Causes of Variations in Radioactivity Data. Am. Jour. Science, New Havem Conn., vol. 241, No. 6, 1943, pp. 345-365.

Because of the geochemical and geothermal importance of radioactivity data, a report is made of recent observations on the variations in the radioactivity of rocks. Variations by a factor of 50 or more are sometimes found in the radioactive content from specimen to specimen. The greatest differences occur in certain granitic rocks, the least in some sedimentary sections. Regional variations are not so pronounced, but relatively highly radioactive provinces are indicated in Colorado and Great Slave- Great Bear Lakes areas and relatively barren areas in parts of Ontario and Quebec. Some laws governing the distribution of radioactive elements are indicated by the discovery that the radioactive elements are more concentrated near the border than at the core of the Bourlamaque batholith, and by additional evidence of a relationship between redioactivity and proportion of accessory minerals, chiefly spatite and zircon. Variations in the radioactivity of granitic rocks, at least, may be due entirely to differences in the amounts of such minerals in which radioactive elements are concentrated. The need for more radioactivity data is emphasized. - Author's abs.

7185. Ridland, G. C. Use of the Geiger-Müller Counter in the Search for Pitchblende-Bearing Veins at Great Bear Lake, Canada. Am. Inst. Min. and Met. Eng., New York, Tech. Pub. 1614, 1943, 7 pp.

An author's abstract of this paper has appeared in Econ. Geol., vol. 38, No. 1, 1943, pp. 88-89 (see Geophys. Abs. 112, No. 6816). - V. S.

7186. Sawdon, W. S. Locating Cased-Off Production by Radioactivity Logging. Petro. End., Dallas, Tex., vol. 14, No. 8, 1943, pp. 43-46.

In radioactivity logging the gamma-ray curve has been supplemented recently by the neutron curve. The first curve measures the natural gamma-ray intensity of formations. The second curve indicates the effect of bombardment of formations by a neutron source within the logging apparatus. This curve discloses strata in the localities where irregularities of radioactivity make the gamma-ray curve inadequate. For example, it succeeds in some extremely radioactive sand areas in California. It can also locate porous strata in limestone in the Gulf coast and Mid-Continent. Since the chief cause of variation in the neutron curve is hydrogen, the curve does not differentiate between water and oil. The apparatus is highly sensitive to hydrogen, so that the logging should be made above the fluid level in the hole. In appearance the neutron curve is somewhat similar to the shallow resistivity curve of an electrical log, though it is a different type of measurement. - V. S.

87. Weltin, Hans. Soft Radiation Geiger Counter. Rev. Sci. Instruments, Lancaster, Pa., vol. 14, No. 9, 1943, p. 278.

The construction of the mica-window Geiger counter for measuring ft radiation (see No. 7180) has been simplifyed by preparing the tube om a single piece of glass. The cathode is made of a coating of Aquadag d connected by means of a platinum wire to the sealed-in tungsten lead. he Geiger counter so equipped has a plateau of 180 volts. It was still able a year after construction. - V. S.

6. GEOTHERMAL METHODS

88. Kovner, S. S. Contribution to the Foundation of the Thermal Method in Prospecting. Compt. rend. (Doklady) Acad. Sciences U.R.S.S., Moscow, vol. 37, No. 3, 1942, pp. 98-100.

This investigation shows that thermal prospecting can detect a dome Artinskian limestone in a formation similar to that of "Second Baku" uguruslan district on the middle Volga). The principles of prospecting ve been described previously (see Geophys. Abs. 114, No. 7066). Approxiate integration by the method of nets was used to compute the thermal elds of three selected profiles. Each profile was calculated on two sumptions as to the position of the Artinskian layer: normal position d lowest possible horizontal position. Then curves were plotted for temrature differences between the assumed positions. These curves largely ree with the actual profile of the upper boundary of the Artinskian limeone, as determined by pervious investigations. The curves are shown the text. - V. S.

89. Kovner, S. S. Numerical Integration of Partial Differential Equations (in Russian). Trans. (Doklady) Acad. Sciences U.S.S.R., Moscow, vol. 37, No. 1, 1942, pp. 22-25.

The theory of geothermal prospecting (see Geophys. Abs. 114, No. 36) involves the integration of partial differential equations by the method nets. The author offers two techniques simplifying these computations. the first, direct calculation of first differences replaces H. Leibmann's lculation of the value of functions (Sitzber. Bayer. Akad. Wiss., Munich, 18, pp. 385-416). To justify this substitution, the computations of the bles of data by both methods are compared in terms of theoretical uations and in a practical example. With reference to temperatures the proposed substitution means, in application to the Dirichlet problem, a change from the calculation of the thermal state in a plate with an assigned boundary temperature to the calculation of the cooling process in a plate with zero temperatures at its edges. In the second technique, by means of the described extrapolation device the first difference tables are obtained sufficiently close to the limit, and all the values of differences in them have the same sign. Thus, further computations can be made spearately for differences A_1 greater than zero, and for differences A_2 smaller than zero, so that the limit is approached simultaneously from above and below. At this stage it is possible to simplify computations considerably by constructing a table $A_3 = (A_1 + \lambda A_2):(1 + \lambda)$, and further, if necessary, $A_4 = (A_1 + \mu A_i):(1+\mu)$, where i = 1 for negative differences, and i = 2 for positive differences. This device makes it possible to determine the limit by five or six steps, while Liebmann's method requires many more steps. - V. S.

7. GEOCHEMICAL METHODS

7190. Bushnell, L. C., and Haas, H. F. The Utilization of Certain Hydrocarbons by Micro-Organisms. Jour. Bacteriol., Baltimore, Md., vol. 41, No. 5, 1941, pp. 653-673.

Cultures of organisms growing in petroleum fractions such as petroleum ether, gasoline, kerosine, light and heavy mineral oils, and paraffin wax were isolated from oil-bearing soil, sedimentation ponds, and other sources. All Pseudomonas could utilize kerosine; bacteria of other genera were also capable of this activity, including certain species of Micrococcus, Corynebacterium, Mycobacterium, and Proactinomyces. The R. Q. of various bacterial cultures on different hydrocarbons varied from 0.3 to 0.7 - L. D. Bushnell, Biolog. Abs., vol. 15, No. 8, 1941, entry 18971; condensed by V. S.

7191. Collins, J. H. Bacteria Make Good Oil Prospectors. Petrol. World, Los Angeles, Calif., vol. 40, No. 8, 1943, pp. 46-50.

In bacteriological prospecting it is necessary to look for the products of bacterial action on three petroleum gases - ethane, propane, and butane. At first the field holes can be run in a straight line across the tract, with a back-and-forth checking; it may be sufficient to dig one or two holes per acre. Gradually a pettern may be discovered and clarified by more drilling. One part of gas in 100,000,000 parts of air is sufficient r a bacteriological analysis. L. W. Blau offered one such test (U. S. atent 2,269,889); R. T. Sanderson, another test (U. S. Patent 2,294,425). his work for the A.P.I. Research Project 43, Scripps Institution, E. ZoBell has discovered improved ways of cultivating soil bacteria ich oxidize petroleum hydrocarbons. He now seeks to develop a method detecting the presence of such bacteria, or of their end products, in eld samples for a use in oil prospecting. Two men in the field should be le to take several dozen samples a day, covering eighty acres. Thus, would be possible to explore very large areas quickly and cheaply. - V.S.

92. Stone, R. W., Fenske, M. R., and White, A. G. C. Bacteria Attacking Petroleum and Oil Fractions. Jour. Bacteriol., Baltimore, Md., vol. 44, No. 2, 1942, pp. 169-178.

Bacterial cultures capable of attacking crude oil, lubricating oils, seline, asphalt, and all other petroleum fractions were isolated from il. The organisms found were all gram-negative rods, including seudomonas and many white-mucoid types. The break-down of oil was companied by an up-take of oxygen, high bacterial count, emulsification, d sometimes a decrease in pH. - R. W. Stone, Biolog. Abs., vol. 16, No. , 1942, entry 22807; condensed by V. S.

93. ZoBell, C. E. Studies on the Bacterial Flora of Marine Bottom Sediments. Jour. Sedimentary Petrol., Madison, Wis., vol. 8, No. 1, 1938, pp. 10-18.

The bacteriological analysis of 126 sediment samples collected along e coast of southern California from bottoms as deep as 2,000 meters veals the presence of several types of bacteria. The chief factors fluencing the bacterial population are the particle size of sediments, ganic-matter content, and core depth. Bacteria which decompose teins, cellulose, starch, chitin, and other complex organic compounds e quite abundant in the botton deposits. The author concludes that the currence of lipoclastic species which utilize the glycerol from fats and ave long-chain fatty acids may help account for the genesis of petroleum. - uthor's abs., condensed by V. S.

94. Zobell, C. E., Grant, C. W., and Haas, H. F. Marine Micro-Organisms Which Oxidize Petroleum Hydrocarbons. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol 27, No. 9, 1943, pp. 1175-1193.

Certain bacteria can oxidize petroleum ether, methane, pentane hexane, and many other hydrocarbons. They are species of Proactinomyces, Actinomyces, Pseudomonas, Micromonospora, etc., found in the sea. All samples of sediments, regardless of distance from land, water depth, or core depth, have shown the presence of these bacteria. Most of them oxidize hydrocarbons only in the presence of free oxygen, although some of them can utilize nitrate, or possibly sulfate, as hydrogen acceptor. Within limits, long-chain hydrocarbons are oxidized more readily than those of smaller molecular weight. Compounds with unsaturated bonds are attacked in preference to saturated compounds. Although the reaction will take place in an aqueous system, the presence of sand, silt, and other inert absorbents accelerates oxidation. The activity of hydrocarbon-oxidizing bacteria may account for the failure of certain workers to find petroleum hydrocarbons in sediment samples. - Authors' abs., condensed by V. S.

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

7195. American Institute of Mining and Metallurgical Engineers. The Professional Training of Geophysicists, Report of Geophysics Education Committee of Mineral Industry Education Division, A.I.M.E. Tech. Pub. 1633, Class J. Mineral Industry Education Division, No. 18, New York, 1943, 19 pp.

The Geophysics Education Committee has devoted several years to a consideration of the problem of training geophysicists. Previous reports have been fact finding (see Geophys. Abs. 108, No. 6439). The present report proposes the following curriculum: (1) MATHEMATICS: Algebra, plane and spherical trigonometry, analytical geometry, calculus, differential equations, complex variables; (2) PHYSICS: General physics, analytical mechanics, heat and kinetic theory, electricity and magnetism, vector and tensor analysis, probability and measurements, potential theory, solid and fluid mechanics, thermodynamics, A. C. theory, electronics, optics, radioactivity, electromagnetic theory; (3) CHEMISTRY: General chemistry, analytical chemistry, physical chemistry; (4) GEOPHYSICS: Elementary geophysics, intermediate geophysics, physics of fluid earth, chemistry of earth, terrestrial electricity and magnetics, earth thermodynamics: (5) GEOLOGY: General geology, field course, crystallography and mineralogy, stratigraphy and paleontology, petrography; (6) ENGINEERING: Shop work, drafting, descriptive geometry, surveying; and (7) MISCELLANEOUS: Geography, biological science, languages, etc. The committee recommends that such a curriculum be offered by separate and independent departments of geophysics having staffs, equipment, and budgets comparable

those of the other departments in the universities. A discussion
ccompanies the report. C. H. Behre thinks that requirements as to
urriculum, staff, and academic background should be lowered. C. A.
eiland distinguishes between geophysical science and geophysical explo-
ation and advocates a curriculum more adapted to exploration; such a
urriculum is outlined. S. F. Kelly stresses the need of a scientific background for geophysical exploration and the flexibility of the committee's
urriculum. W. R. Chedsey points out that the committee's curriculum
mphasises basic sciences in agreement with the views expressed at the
eetings. - V. S.

196. Blau, L. W. Geophysics, Geochemistry, and the Practical Man. Min. and Met., New York, vol. 24, No. 441, 1943, pp. 396-397.

Practical oil men sometimes are skeptical of geophysical methods,
onsidering them to be too theoretical. The writer seeks to overcome this
erjudice by circumscribing the various activities entering into exploration.
he functions of geophysics and geochemistry in petroleum engineering are
determine geological structure, location of producing horizons, liquid
vels in boreholes, etc. Geophysicists do electrical and radioactive
gging, acoustic logging, hole-diameter measurement, liquid-level deter-
ination, and perforating. Geochemists are concerned with reservoir
perations, geochemical logging, and mud logging. This demarcation leaves
petroleum engineers drilling, mud control, and transportation. - V. S.

197. Brant, Arthur. Aerial Geophysical Prospecting. Canadian Min. and Met. Bull., Montreal, No. 376, 1943, pp. 395-396.

Geophysical exploration can be made from airplanes. The author
iscusses briefly such a possibility for the magnetic, electromagnetic and
ravimetric methods. For each of these methods he outlines: (1) Theoreti-
al basis, (2) apparatus, and (3) limitations; further comments are added in
cases. A more complete treatment is promised in a forthcoming paper.
V. S.

198. Daly, R. A. Meteorites and an Earth Model. Bull. Geol. Soc. America, Washington, D. C., vol. 54, No. 3, 1943, pp. 401-456.

The author discusses the old hypothesis that the earth represents
eteoritic material. With Jeffreys he assumes the planet to have been
itially gaseous, with a mean temperature well above the boiling point of
ron, namely 3,000°. A large part - perhaps much more than half - of the

original body of gas may have been lost to space because of volatility at the high temperature. Condensation of the residual gas to liquid and differentiation in both the gaseous and liquid states occurred, but by processes significantly different from those pictured by Jeffreys. The suggested course of development gives an existing earth which has the following succession from surface to center: a true crust, the lithosphere; a thicker, vitreous asthenospheric shell; a still thicker, crystallized mesospheric shell; and a nickel-iron core, probably fluid and possibly behaving much like a gas.

The paper summarizes the principal observed facts about the nature of meteoritic stones and irons, and the reasons for supposing them to be fragments of a disrupted parental planet. A cause for this disruption and therewith explanation for some of the general characteristics of meteorites are briefly discussed. After comparison between earth and parental planet, the imagined evolution of the earth is tested by reference to the terrestrial discontinuities, mean density, moment of inertia, radioactivity, and plasticity. Rough estimates of temperatures in depth and degrees of strength of the materials in depth are deduced. - Author's abs.

7199. Fleming, J. A. The American Geophysical Union. Science, Lancaster, Pa., vol. 97, No. 2530, 1943, pp. 565-568.

A description is given of the organization of the American Geophysical Union, the resolutions and discussions at the twenty-fourth annual meeting, the election of officers, financial statement, international affiliations and activities, the membership and work of the International Commission on Continental and Oceanic Structure, and the responsibilities of American geophysicists during and after the war. - V. S.

7200. Gabriel, V. G. Geophysical Methods Defined. Petrol. World, Los Angeles, Calif., vol. 40, No. 10, 1943, pp. 28-29, 47.

The author briefly outlines the major geophysical methods: Seismic, electric, gravitational, magnetic, geothermal, radioactive, and geochemical. He states that for the United States as a whole, wild-cat wells drilled on the structures recommended by geophysicists and geologists are four times more successful than those drilled without the application of geophysics. California shows a ratio even more favorable to geophysics. About $30,000,000 is spent annually in the United States on geophysical exploration for oil alone. - V. S.

201. Goldstone, F. Maintaining an Adequate Level of Geophysical Exploration. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 27, No. 7, 1943, pp. 948-953; Geophysics, Menasha, Wis., vol. 8, No. 3, 1943, pp. 237-243.

This article appeared in The Oil and Gas Journal, Tulsa, Okla., vol. 41, No. 48, 1943, pp. 56-61 (see Geophys. Abs. 113, No. 6946). -V. S.

202. Heiland, C. A. War Affects Geophysical Activity: More Recent Developments Reviewed. South African Min. and Eng. Jour., Johannesburg, vol. 54, No. 2633, 1943, pp. 435-437.

In the year 1942 geophysical activity was curtailed by war, but much revious work came to fruition. (1) In gravimeter prospecting the instruents and techniques were perfected. Some investigators worked to mprove the Bouguer and tidal corrections. An integraph for the evalution f the effects of assumed subsurface features was developed. A simpliication in torsion-balance techneque was proposed for measuring vertical nd horizontal gravity gradients at right angles to the strike. (2) In agnetic prospecting refinements of measurements were obtained in conection with military uses. (3) Seismic reflection mapping continued to ccupy the most prominent place in oil exploration. Improvements were ttained in manual and automatic gain controls, filter combinations, and ontrolled feed-over between channels. Studies were conducted of the ransient behavior and limiting sensitivity of seismograph, the explosion f dynamite charges, the curved-ray analysis, and mechanical devices o facilitate curved-ray interpretation. (4) In electrical logging there were etailed studies of the distribution of radioactive substances in sedimentary ormations. Improvements were attained in radioactive measurements; he Schlumberger self-potential dipmeter was the most significant develop- ent in this work. (5) Geochemical prospecting was promoted by the pplication of the microbiological principle. In addition to the above entioned developments the paper reviews field-prospecting for oil, search or strategic materials, and geophysical education. - V. S.

203. Howard, W. V. Geologists survey Needs for Increased Discovery Rate. Oil and Gas Jour., Tulsa, Okla., vol. 40, No. 50, 1942, pp. 43-45, 46.

This article covers the survey of oil discovery methods summarized y the A. A. P. G. Research Committee for the introductory evening ession of the annual convention in Denver, Colo. The project under the Chairmanship of A. I. Levorsen covered philosophical considerations, geology, stratigraphy and sedimentation, research, geophysics, geochemistry, and other topics. - D. W., Mines Mag., vol. 33, No. 4, 1943.

7204. Levorsen, A. I. Discovery Thinking. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 27, No. 7, 1943, pp. 887-928.

This article appeared in The Oil Weekly, Houston, Tex., vol. 109, No. 6, pp. 11-17, 26; No. 7, pp. 14-17, 20; No. 8, pp. 12-13, 26-28; 1943 (see Geophys. Abs. 113, No. 6952). An abridged version appeared in The Oil and Gas Journal, Tulsa, Okla., vol. 41, No. 48, 1943, pp. 38-39, 42-46. - V. S.

7205. Parsons, C. P. Further Developments in Caliper Logging (Abs.). Oil Weekly, Houston, Tex., vol. 109, No. 10, 1943, p. 54.

Caliper logging is discussed in relation to: (1) Setting surface casing, particularly in deep wells where the possibility of a blow-out is great; (2) application of permeability characteristics to geological correlation; (3) the relation between mud-cake thickness and permeability; experiments are described; (4) the effects of acidizing, especially to learn whether the acid had penetrated the type of formation desired; and (5) determination of erosion by the mud-stream. - V. S.

7206. Schnellmann, G. A. The Structural Homogeneity of Some British Mining Fields. Min. Mag., London, vol. 69, No. 1, 1943, pp. 9-14.

Five notable British lead-zinc mining areas were compared and shown to have identical geological structures. This identity is discussed as a basis for exploration. The contention is made that a comparative analysis of fields to discover their common characteristics carries possibilities of ore finding. Admittedly, objections may be raised against the implication that any area possessing structural features common to productive fields is a potential ore locus. Strictly speaking, promising structures should stand in suitable relations to source cupolas. Yet, none of the compared mining areas are demonstrably related to cupolas. An igneous source is not observed, but only inferred from the presence and nature of the ore bodies; if it exists, it must be very deep-seated. However, generally speaking, an interdependence between domes and source cupolas is quite conceivable; in Cornwall each of the five granite masses is the core of a dome. - V. S.

07. Taylor, Frank B. Some Approaches to Development of Better Oil Finding Tools. Oil Weekly, Houston, Tex., vol. 111, No. 1, 1943, pp. 82-90.

The writer describes the improvements in existing geophysical thods and the search for new methods. (1) In seismic prospecting, s now possible to make multistage records and records of different quencies; refraction surveys can obtain records of secondary arrivals areas of unconsolidated sands. There are also improvements in shots, ceivers, and records. (2) In gravimetric and magnetic prospecting, re stations are made, quicker results are secured, and greater details possible. The gravimeter and the magnetometer have been perfected. Stratigraphic drills have been improved so that deeper coring is ssible. Slim-hole drilling affords the most important method of search- for stratigraphic traps. (4) In core analysis more accurate, economic, speedier ways have been devised, coring equipment has been perfected, tests are made of new methods, in part secretly. (4) In geodynamic specting, the undisturbed rate of gas diffusion is measured throughout a urface area. Use is made of bacteria found near petroleum wax. A e of mud analysis aims to employ ultra-violet light to produce prescence. Some other lines of research are likewise mentioned in the per. - V. S.

08. Tiratsoo, E. N. The Origin of Petroleum. Petroleum, London, vol. 6, No. 1, 1943, pp. 7-9, 12.

In spite of the sifting of evidence which has gone on uninterruptedly the better part of a century the origin and process of formation of roleum still offer a field for speculation. The theories advanced from e to time are here summarized, with a statement of the objections sed to each theory, leading to the conclusion that thouugh an animal gin is the more likely, vegetable life may have contributed to the source material, formed in a marine environment. Support is given by the hor to the theory that the process of formation of petroleum from this terial may have been one involving the action upon it of α-radiation. - thor's abs.

09. Uren, L. C. Inspection and Analysis of Formation Samples: Selection and Preparation of Formation Samples for Laboratory Inspection. Petrol. Eng., Dallas, Tex., vol. 14, No. 7, 1943, pp. 72-76.

This article is the first of a series. It deals with the selection and preparation of formation samples for laboratory inspection. Samples can be classified into types according to modes of drilling; different types have unequal value for analysis. In cable drilling 12 types are described. In rotary drilling the returns are so disintegrated that coring tools must be used. The merits of several coring instruments are discussed. In the process of coring the samples often undergo destructive alterations; some causes are indicated. On reaching the surface a core is reassembled on a tray, observations are made of the apparent fluid content of different strata, and measurements are taken to the top and bottom of each stratum. A selection is then made of cores representative of strata. Inasmuch as the laboratory analysis includes tests for porosity, permeability, fluid content, etc., portions of the core must be chosen for these tests and cut or dressed to suitable form, depending on the apparatus. Some speciments are treated further with solvents required by the tests. - V. S.

7210. Uren, L. C. Inspection and Analysis of Formation Samples: Determination of Fluid Content and Permeability of Core Samples by Quantitative Laboratory Tests. Petrol. Eng., Dallas, Tex., vol. 14, No. 8, 1943, pp. 62-72.

This article is the second of a series. It explains methods of making permeability tests and determining the fluid content of samples. (1) The permeability test measures the quantity of fluid passing through a sample per unit of time under controlled pressure. The tests require samples from which fluids and soluble residues have been removed by heat or solvents. Extraction can be made by means of the Soxhlet apparatus. Permeameters, laboratory techniques, and the "Darcy" units of permeability are discussed. (2) The fluid content of a sample is measured by weighing the core specimen before and after the extraction of fluid. When porosity is known, the average saturation may be computed. Methods are described for determining water saturation, connate water salinity, oil saturation, and oil gravity. A comprehensive bibliography on permeability and fluid content is appended. - V. S.

7211. Uren, L. C. Inspection and Analysis of Formation Samples: Determination of Porosity and Grain-Size Distribution. Petrol. Eng., Dallas, Tex., vol. 14, No. 9, 1943, pp. 51-60

This article is the third of a series. It is devoted to methods of determining porosity and grain-size distribution in formation samples. (1) The porosity of a rock specimen is defined as the ratio of the aggregate volume of its void pore spaces to its gross bulk volume. Bulk volume can

measured by several methods: Mercury displacement, fluid displace-
ent of a saturated specimen, paraffin coating and weighing in air and
ter, dimensional measurements, and a determination from weight,
ecific gravity, and pore volume. Pore volume is measured indirectly
determining the volume of the mineral substance. This can be done by
s displacement, use of liquids of known density, crushing the specimen
d weighing its grains, and a dividing of total weight by specific gravity.
e methods are described. (2) Grain-size distribution in samples is
termined by disaggregating specimens without crushing the grains.
e percentages, by weight, of granular fragments segregated within
fferent size ranges indicate the grain-size distribution. The steps of
saggregation, leaching with solvents, and screen sizing are described.
ternative methods of size classification include elutriation and rate of
ttling in water. - V. S.

12. Uren; L. C. Inspection and Analysis of Formation Samples: Orientation of Cores; Segregation and Identification of Mineral Components and Micro-Fossils in Formation Samples. Petrol. Eng. Dallas, Tex., vol. 14, No. 12, 1943, pp. 53-58.

This article is the fourth of a series. It deals with the orientation
core samples for determining the inclination of strata; and the segre-
tion and identification of mineral and fossil components of samples for
rrelating strata. (1) The Orientation of cores can be made by utilizing
eir magnetic polarity. The crystals of rocks freed by weathering
e deposited in sedimentary formations with their poles in the magnetic
eridian. Formation cores thus possess distinct polarity. By means of
s polarity it is possible to orient the cores in their original position
the earth. Success depends upon the amount of magnetic material in
e cores. An apparatus has been devised by the Standard Oil Co. of
lifornia for orientation. (2) The segregation of mineral components
cores for identification can be accomplished by means of the following
ncentration techniques: (a) Heavy mineral concentration by gravitational
gragation with the aid of heavy liquids; (b) magnetic separation of minerals
ssessing magnetic susceptibility; (c) dielectric separation of minerals;
d (d) electrostatic separation. These techniques are described. Micro-
ssils found in samples of sedimentary origin can be identified by
icroscopic study. - V. S.

13. Weaver, Paul. The Geophysicist as a Forecaster. Geophysics, Menasha, Wis., vo. 8, No. 3, 1943, pp. 273-289.

The commercial geophysicist has hitherto been little concerned with a realm of geophysics which deals with the detection of nonequilibrium by measuring the time rate of change of a physical property in a localized area, in order to forecast when a critical point will appear in the system, and what magnitude of transition is probable. The author has selected some examples of such geophysical problems, which he considers of great economic importance, and which would appear amenable to our present technique or to some modification thereof. There are discussed: (1) Artificial nonequilibrium: wells, mines and quarries, extraction of underground fluids; and (2) Natural nonequilibrium: weather, particularly fog, earthquakes and landslides, volcanoes. - Author's abs.

7214. Yacimientos Petróliferos Fiscales, Dirección General. Memoria de Y. P. F. del Ano 1941 (Report of the Argentine General Administration of Government Oil Fields for the Year 1941). Bol. Inf. Petról., Buenos Aires, vol. 19, No. 216, 1942, pp. 13-15.

During the period 1940-41 geophysical exploration in Argentina was conducted in the Provinces Salta, Mendoza, San Juan, Chaco, and Neuquén. Torsion-balance and gravimetric surveys predominated in the plains; gravimetric surveys alone were made in mountainous country. In locations requiring more detailed data the seismic method was used. Various anomalies were discovered. The work is described for each Province; the extent of the areas surveyed is indicated in square kilometers. - V. S.

9. NEW PUBLICATIONS

7215. American Institute of Mining and Metallurgical Engineers, Petroleum Division. Petroleum Development and Technology. Trans. Am. Inst. Min. and Met. Eng., New York, vol. 151, 1943, 601 pp. Price, $5.00.

This volume is the eighteenth of the Petroleum Development and Technology series of the Petroleum Division of A.I.M.E. It contains papers and discussions presented before the Division at meetings held at New York, February 9-12, 1942; Los Angeles, October 15-16, 1942 and Austin, October 29-31, 1942; Also the petroleum statistical reports covering the year 1942. There are six chapters devoted respectively to (1) Production Engineering, (2) Engineering Research, (3) Geophysical Exploration, (4) Petroleum Economics, (5) Production, and (6) Refining. - Bull. Am. Assoc. Petrol. Geol., vol. 27, No. 9, 1943, p. 1271.

16. Anderson, E. M. The Dynamics of Faulting and Dyke Formation, with Application to Britain. London, Oliver & Boyd, 1942, 191 pp., 38 figs. Price, 15 s.

Faults and dikes are particularly well represented in Britain so that
e island offers a good opportunity for their study. The dynamics of the
rth crust is analyzed in terms of an ideal state serving as the standard
reference; therein the lateral pressure from all sides increases steadily
th depth, in order to equal the vertical pressure everywhere. Faulting
d dike formation are viewed as departures from this state. Although the
thor's reasoning is partly deductive, there are constant references to
ctual observations. The book contains eight chapters supplied with
bliographies. The terminology is simple throughout the text. - C. R.
ngwell, Econ. Geol., vol. 38, No. 5, 1943, pp. 423-425; condensed by V. S.

17. Institution of Petroleum Technologists. Petroleum: Twenty-Five Years Retrospect, 1910-35. London, 219 pp., 46 ills.

The Institution of Petroleum Technologists, London, has published
review of advances in petroleum science from 1910-35. Various contribu-
rs have outlined technical developments in petroleum economics, geology,
ospecting, geophysics, drilling, production engineering, distillation,
ackling, refining and treatment, transportation and storage, ocean trans-
rt, storage installations, distribution of petroleum products, chemistry
petroleum, tests of petroleum and their standardization, fuel development
r internal-combustion engines, natural gas, chemical intermediates and
ecial products, asphaltic bitumen and asphalt, Scottish shale-oil industry,
d production of oil from coal. - V. S.

18. Nevin, C. M. Principles of Structural Geology, 3d ed., New York, Wiley & Sons, 1942, 320 pp., 165 figs. Price, $3.50.

The first edition of this textbook was published in 1931. The present
ition is considerably revised. The chapter on faults shows additions and
provements which do not alter its theoretical character. The chapter
igneous structures, written by E. B. Mayo, has been somewhat modified;
t it still leaves the impression that differential movement in flow is due
the sideward pull of the channel walls. The chapter on structures in
consolidated sediments amplifies the discussion of the role of gravi-
ional compaction in the dewatering of sediments. The other chapters
ich deal with the constitution of the earth, continents and ocean basins,
stasy, orogenic movements, etc., have also been modified and somewhat
panded. - E. Bliss Knopf, Am. Jour. Science, vol. 241, No. 9, 1943, pp.
3-596; condensed by V. S.

7219. Newmark, Maxim. Dictionary of Science and Technology in English-French-German-Spanish, 386 pp. Printed in the United States by East Printing Co., Inc., New York, for the Philosophical Library, Inc., 15 East 40th Street, New York, N. Y. Price, $6.00.

This dictionary is designed to assist readers of foreign texts dealing with the physical sciences and their applied fields. It gives French, German, and Spanish equivalents for some 10,000 current technical terms in English. Subjects of interest to geophysicists include radio theory and technology, meteorology, chemistry, physics, electrical physics, surveying, and machineshop practice. The entries are arranged alphabetically, and each entry is numbered. Separate indexes of French, German, and Spanish terms, correspondingly numbered, permit a two-way use of any one of these languages with the English. The author has included new terms brought into existence by the war. - V. S.

7220. Van Tuyl, F. M., and others. Review of Petroleum Geology in 1942. Colorado Sch. Mines Quart., Golden, Colo., vol. 38, No. 3, 1943, 75 pp. Price, $1.00

This review was prepared by the staff of the Colorado School of Mines. It constitutes the first report in the series inaugurated in 1942 by the research committee of the American Association of Petroleum Geologists. The sections bear the following titles: Important Events of the Year, Advances in Petroleum Geology and Allied Subjects, Aerial Photographs, Miscellaneous New and Improved Techniques, Noteworthy Discoveries (of petroleum deposits), Contributions of Petroleum Geology to Pure Geology, Production and Reserves and Trends in Petroleum Geology and Geophysics. A considerable geological literature is surveyed, and a comprehensive bibliography is appended. - J. L. Ferguson, Bull. Am. Assoc. Petrol. Geol., vol. 27, No. 8, 1943, pp. 1164-1165; condensed by V. S.

10. PATENTS

7221. Gain Control; B. E. Moritz, Jr., Houston, Tex., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,316,354, issued April 13, 1943.

Apparatus for seismic surveying comprising means for generating seismic waves, a seismometer, an amplifier associated with said seismometer, said amplifier including a variable gain section, a recorder actuated by said seismometer through said amplifier, means for changing the gain of said variable gain section of said amplifier solely in the direction of creasing gain, means responsive to the average amplitude of the signals ssing the output of said amplifier for varying the rate of change of said riation in gain, and means responsive to the operation of said first- entioned means and operative a predetermined time after the operation said first-mentioned means for initiating the action of said last- entioned means at a time interval after the arrival of the first of said gnals at amplifier. - Claims allowed, 8.

22. Vibration Responsive Device; F. K. Powell, Schenectady, N. Y., assignor to General Electric Co., a corporation of New York. U. S. Patent 2,316,616, issued April 13, 1943.

A vibration-velocity responsive (horizontal-component permanent- agnet) device comprising a shell of magnetizable material with a sub- antially concentric center rod mounted in the shell, a permanent magnet it mounted on said center rod with substantially cylindrical pole pieces ving cylindrical surfaces spaced from the inner surface of said shell to rm a pair of annular air gaps, an electrical winding structure including pair of current-conducting coils within said air gaps, and a resilient ounting for said winding structure providing stiffness with respect to ansverse motion and resilience with respect to relative axial motion tween the electrical winding structure and the permanent-magnet pole eces. - Claims allowed, 5.

23. Apparatus for Amplifying and Measuring Small Displacements; O. H. Truman, Salt Lake City, Utah. U. S Patent 2,316,915, issued April 20, 1943.

In apparatus for amplifying and measuring minute displacements sable as an indicating device for a gravimeter), the combination of an ectrical resonant circuit which includes a capacitance which is variable response to the displacement to produce a current flow in said circuit hich is a function of the displacement, and a potentiometer circuit oper- ively connected with the capacitance of the resonant circuit for normal- ing the capacitance of the latter circuit, said potentiometer circuit cluding means for measuring the normalizing effect thereof as a function the displacement. - Claims allowed, 12.

24. Automatic Volume Control for Recorder Amplifiers; O. S. Petty and J. O. Parr, Jr., San Antonio, Tex.; said Parr assignor to said Petty. U. S. Patent 2,318,624, issued May 11, 1943.

In an amplifier for use between a seismic wave detector and a recorder, the combination of a plurality of thermionic tubes, means associating said tubes for cascade seismic frequency amplification, an automatic volume control tube responsive to the output of one of said tubes, means associating said A. V. C. tube with one of said amplifier tubes to control the gain of the latter, and means to prevent blocking of a subsequent tube only in said cascade by the signals flowing thereto, said means being limited to operations when the signals applied thereto exceed a predetermined threshold value. - Claims allowed, 16.

7225. Measuring Device; F. G. Boucher, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Deleware. U. S. Patent 2,318,665, issued May 11, 1943.

In a system for measuring a force acting torsionally on a helical torsion spring having an anchored end and an end subjected to said force, means for applying to a turn of said spring at a point closer to the anchored end than to the other end thereof a second force in opposition to said first mentioned force and means to indicate a value proportional to the amount of said second mentioned force. - Claims allowed, 4.

7226. Signal Controlled Amplifier; Le Roy C. Paslay, Chicago, Ill., assignor to National Geophysical Co., a corporation of Deleware. U. S. Patent 2,319,626, issued May 18,1943.

An electronic (seismograph) amplifier adapted to maintain a substantially constant output when the mean signal input thereto varies substantially unidirectionally through a wide range during an interval of time, including: An amplifier having at least two tubes in cascade; means independent of said signal for automatically varying the gain of at least one tube inversely to said input during said interval; and means for varying the gain of at least one succeeding tube inversely to said signal variation. - Claims allowed, 12.

7227. Gravitational Force Measuring Apparatus; W. A. Marrison, Maplewood, N. J., Assignor to Bell Telephone Laboratories, Inc., New York, a corporation of New York. U. S. Patent 2,319,940, issued May 25, 1943.

A device for indicating gravitational effects comprising a rotating element, constant-speed means for driving said element, a column of liquid carried by the rotating element near its axis of rotation, a second column f liquid carried by the element at a peripheral point remote from the axis, liquid-conveying conduit connecting the columns, and means responsive o the difference in heights of said columns when the element is rotating or indicating the gravitational force exerted upon the liquid. - Claims llowed, 16.

228. Well-Surveying Method and Apparatus; Jacob Neufeld, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware: U. S. Patent 2,320,643, issued June 1, 1943.

Method of geophysical prospecting that comprises placing quantities f radiation-emitting material within a frangible envelope at selected ocations within the locality being studied, permitting the material to istribute itself within the locality in a manner related to a significant eological characteristic thereof, and detecting variations in said characeristics by measuring radiation in said locality. - Claims allowed, 5.

229. Method of Analyzing Earth Formations; H. H. Thompson, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware: U. S. Patent 2,320,681, issued June 1, 1943.

In a method of well logging wherein a plurality of samples of earth ormations are taken at a plurality of vertically spaced points, the imrovement comprising treating at least a portion of each of said samples ith a liquid of known density, recovering at least a portion of each of aid liquids, separately determining the pressure change necessary to ender the apparent density of the recovered equivalent to the initial known ensity of the treating liquid. - Claims allowed, 3.

230. Well-Surveying Method and Apparatus; W. G. Green, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware: U. S. Patent 2,320,863, issued June 1, 1943.

A device for cable suspension within a deep-well bore for locating he well bottom which comprises, a fluid-tight hollow capsule, electrical neans within said capsule for transmitting a signal to a point exterior of he well bore, a normally open switch also within the capsule for conrolling operation of said electrical means, an armature carried by said witch, said armature being interiorly supported from the capsule in roximity to the bottom wall thereof, magnetic means located wholly xteriorly of said capsule and means for supporting said magnetic means rom said capsule for vertical sliding movement therebeneath, whereby when the magnetic means strikes the bottom of the well it is displaced upwardly toward the armature to increase the lines of force acting thereon sufficiently to cause the switch to be closed. - Claims allowed, 1.

7231. Method of Geophysical Prospecting; W. L. Russell, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware: U . S. Patent 2,320,890, issued June 1, 1943.

Method of geophysical prospecting that comprises positioning at preselected irregularly spaced locations within a well, casing units individually possessing radiation emissive characteristics capable of detection by a radiation sensitive prospecting instrument in the immediate vicinity thereof, and logging the well with a radiation sensitive prospecting instrument. - Claims allowed, 2.

7232. Method of Geophysical Prospecting; S. A. Scherbatskoy and R. E. Fearon, Tulsa, Okla., assignors to Well Surveys, Inc., Tulsa, Okla., a corporation of Deleware: U. S. Patent 2,320,892, issued June 1, 1943.

A method of locating cement behind a casing in a well that comprises making layers of radioactive cement separated by layers of nonradioactive cement, said nonradioactive cement layers being formed of measured quantities of cement, and determining the location of said radioactive layers. - Claims allowed, 8.

7233. Apparatus for Measuring Pressures in Containers; G. L. Hassler, Berkeley, Calif., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,321,293, issued June 8, 1943.

For use in (geochemical prospecting) in combination with a plurality of sealed-gas containers each having a valved outlet, single means for consecutively measuring the pressure in said containers, said means comprising a tube of small volumetric capacity fluid-tight clamping means for fixing one end of said tube in register with the valved outlet of one of said containers, a closed vessel partially filled with liquid sealed about the other end of said tube, said other end extending into vessel below the surface of said liquid, a source of gaseous pressure, a conduit in communication between said source and the space above the liquid surface in said vessel, valve means in said conduit for applying a controlled gaseous pressure from said source to said vessel, whereby said liquid is caused to enter the ube immersed therein to a predetermined level, and manometer means onnected to said conduit in parallel with said vessel for indicating the aseous pressure applied thereto when the liquid reaches said level. - laims allowed, 2.

234. Apparatus for Logging Boreholes; L. G. Howell, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,321,295, issued June 8, 1943.

An apparatus for logging boreholes comprising a Geiger-Müller ounter adapted to be lowered into a borehole, a source of D. C. power at he surface for operating said Geiger-Muller counter, a single-conductor able for conducting said D. C. power from the surface to said counter, neans arranged in the circuit between said source of power and said ounter and adapted to move with the counter for stepping up the voltage upplied by said D. C. source to the value required for operation of said ounter, means connecting the output of said counter to said single- onductor cable, means at the surface for separating the output pulses of e counter from the applied D. C., and means at the surface for recording e output pulses of said counter. - Claims allowed, 5.

235. Seismic Surveying; B. B. Weatherby, Tulsa, Okla., and W. T. Born, Bloomfield, N. J., assignors to Geophysical Research Corporation, New York, N. Y., a corporation of New Jersey. U. S. Patent 2,321,341, issued June 8, 1943.

In seismic prospecting apparatus for receiving seismic waves, the mplitudes of which decrease as a function of time, means for converting aid waves into electrical pulsations of corresponding magnitude and con- ucting said pulsations to a recorder responsive to the amplitudes of the ulsations, means associated with said recorder for initially reducing its esponsiveness to said pulsations below its normal response and then ncreasing its response to said pulsations at a rate which is in substantially nverse proportion to the rate of decrease of the amplitudes of said waves, hereby the amplitude of the recorded waves is maintained substantially onstant. - Claims allowed, 16.

236. Seismic Surveying; L. F. Athy and H. V. McCollum, Ponca City, Okla., assignors to Continental Oil Co., Ponca City, Okla., a corporation of Delaware. U. S. Patent 2,321,450, issued June 8, 1943.

The method of profiling at least one subsurface stratum, which comprises producing seismic waves at a first source, receiving seismic waves from said first source after reflection from said stratum at two or more reception points spaced from said source and out of line therewith, recording the effects of said seismic waves as a plurality of traces on a common record; producing seismic waves at a second source spaced from said first source and out of line with said reception points, receiving seismic waves from said second source after reflection from said stratum at said reception points, and recording the effects of said last mentioned seismic waves as a plurality of traces on a second common record, the length of the reflected wave path between said first source and one of said reception points being substantially the same as the length of the reflected wave path between said second source and the other of said reception points, and said two reflected wave paths having substantially identical reflection points on said subsurface stratum. - Claims allowed, 21.

7237. Coring Device; Benjamin W. Sewell, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,322,064, issued June 15, 1943.

A pressure-coring device comprising a cutting head adapted to cut a core and having a central passage adapted to receive the core, a core-receiving barrel arranged behind said cutter head adapted to assume a forward position and a retracted position and arranged for communication with said passage when in its forward position, means for holding said barrel in its forward position during the coring operation, means operable by a falling weight to move said barrel to its retracted position upon completion of the coring operation, and means operable upon removal of said barrel to its retracted position for sealing said barrel under the pressure of the formation cored. - Claims allowed, 3.

7238. Well-Surveying Method and Apparatus; Serge A. Scherbatskoy, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,322,478, issued June 22, 1943.

Apparatus to measure rate of drilling of a well bore that comprises means for generating a first series of uniformly pulsating electrical signals; means for generating a second series of electrical signals corresponding to unit increments of drilling; means actuated by said second series of electrical signals in accordance with the number of units of depth drilled; means actuated in accordance with the number of said electrical signals occurring during the time required to progress said units of depth, means for interrupting both of said series of electrical signals; means movable n accordance with the depth of the drilling operations; and means for ecording the number of units of depth drilled and the number of said iming signals in correlation with depth. - Claims allowed, 3.

239. Leveling Device; F. G. Boucher, Tulsa, Okla., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,322,615, issued June 22, 1943.

A (gravity meter sub-base) device for leveling and supporting nstruments comprising, in combination, a member having an upper surface n the shape of a portion of a sphere and a lower portion adapted to rest on n irregular surface, a second member arranged to carry an instrument, nd means for supporting said second member on said first member consisting of three equidistantly spaced downwardly extending leveling screws ttached to the lower surface of said member, a gripping cup secured to ach leveling screw, each gripping cup being provided with a lower plane urface with a rubber ring secured thereto, and a ball and socket joint onnecting the upper end of each gripping cup with its corresponding djusting screw. - Claims allowed, 3.

240. Method and Apparatus for Logging Boreholes; L. G. Howell and L. W. Blau, Houston, Tex., assignors to Standard Oil Development Co., a corporation of Deleware. U. S. Patent 2,322,634, issued June 22, 1943.

A method for determining the distribution of radioactive material round a borehole, which comprises making a plurality of radioactive neasurements inside the borehole, each measurement being confined to selected direction by maintaining the azimuthal position of the detector ubstantially constant during the measurement, and the different measurements being made in different directions. - Claims allowed, 7.

241. Condenser Gravity Meter; Hughes M. Zenor, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent, 2,322,681, issued June 22, 1943.

A gravity meter comprising, in combination, a condenser, one plate f which is movable in response to changes in gravity in a manner to change he value of the capacity of said condenser, a fixed condenser equal in apacity to the aforesaid condenser at a base station, an oscillator comprising an oscillating circuit, means for selectively connecting one or the ther of said condensers in said circuit, a second oscillator, means for eating the frequency of said oscillators one against the other, said second oscillator including means for adjusting the frequency thereof when either of said condensers is in the circuit of said first oscillator, whereby any change in the frequency of said first oscillator occasioned by alternately connecting said condensers in said first oscillating circuit at a field station constitutes a measure of the difference in gravity between said field station and the base station. - Claims allowed, 5.

7242. Well-Logging Method and Apparatus; Jacob Neufeld, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,323,484, issued July 6, 1943.

Method of geophysical exploration that comprises moving within a well bore a mass of metallic sodium rendered artificially radioactive by bombardment with a stream of fast deutcrons; measuring the radiation emanating from the mass reflected by subterranean strata; and correlating the measurements so derived with measurements of depth. - Claims allowed, 6.

7243. Method and Apparatus for Determining Effective Porosity; Elmer O. Mattocks, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,323,556, issued July 6, 1943.

In apparatus for determining the volume of connected pore spaces in a porous body, the combination comprising a receptacle for containing the body at a predetermined pressure, pressure indicating means connected to the receptacle, means for transmitting gas into the receptacle at a known pressure above said predetermined pressure, gas receiving means of variable volumetric capacity connected to the receptacle, and means associated with the gas receiving means and controlling the pressure within the gas receiving means without loss of gas transmitted thereinto. - Claims allowed, 7.

7244. Geochemical Well Logging; Leo Horvitz and Esme E. Rosaire, Houston, Tex., said Horvitz assignor to said Rosaire. U. S. Patent 2,324,085, issued July 13, 1943.

A method for logging during the drilling of a borehole drilled for the purpose of producing hydrocarbons comprising the steps of determining for a considerable portion of the length of the borehole, including a substantial portion traversing nonproductive formations, the relative hydrocarbon content at different depths of the earth traversed by the borehole, and correlating said relative values with depths. - Claims allowed, 16.

245. Well Survey Apparatus; L. C. Miller, Dallas, Tex., assignor of one-half to Eastman Oil Well Survey Co., Dallas, Tex., a corporation of Delaware, and one-half to Eastman Oil Well Survey Corporation, Long Beach, Calif., a corporation of California. U.S. Patent 2,324,103, issued July 13, 1943.

A protective housing for well-survey instruments including, an outer asing, an inner coaxial casing, a coupling element having the upper ends f said casings secured thereto, whereby said element closes said upper nds and also whereby the casings are suspended therefrom, heat-insulating aterial between the casings, a cooling container insertable within the inner asing which casing is also adapted to receive the well survey instrument, closure for closing the lower end of the inner casing, and a packing and losure element removably secured in the lower end of the outer casing r closing and sealing the same. - Claims allowed, 7.

246. Process for Locating Valuable Subterranean Deposits; L. W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Reissue Patent 22,345, issued July 13, 1943; original No. 2,269,889, issued January 13, 1942.

A method of prospecting for petroleum deposits which comprises ollecting samples of soil at spaced points along the surface over an area nder investigation, and examining said samples for the determination of he presence therein of a product of the action of hydrocarbon-consuming acteria on hydrocarbons. - Claims allowed, 11.

247. Projectile for Perforating Bore Hole Casings; Marcel Schlumberger, Paris, France. Vested in the Alien Property Custodian. U. S. Application A.P.C. 276,093, published May 4, 1943.

The present invention relates to shooting devices, and more particu- arly to apparatus for perforating the metallic casings usually inserted ithin boreholes after drilling. These objectives are attained by providing composite perforating projectile which comprises essentially an inner ore of hard and relatively heavy metal such as, for example, hardened teel, and an outer sheath preferably formed of a light and somewhat riable material such as, for example, an aluminum alloy. The projectile s so constructed that the soft outer sheath is torn away from the core as oon as it is discharged from the gun, and only the hard steel core pierces he metallic borehole casing. It is also proposed to design the outer sheath o as to facilitate its removal from the hard core when discharged from he gun. - V. S.

7248. Method and Means for Determining and Tracing Insulating, in Particular Oil-Carrying Strata; Oscar Martienssen, Kiel, Germany. Vested in the Alien Property Custodian. U. S. Application A.P.C. 333,469, published May 18, 1943.

This invention relates to methods and means for determining and tracing geophysical strata of insulating character, in particular oil-carrying beds, by measurements taken at the earth surface. Nonoscillatory surges of an electric charge are applied to the ground in a shock-like or explosive manner and in such a way that they decay aperiodically. These aperiodic surges spread in the ground, and when meeting an insulating, in particular oil-carrying, bed are impeded and reflected to the surface. The reflected charge arriving at the surface is received by means of electric receiving devices as used for radio and telegraphic purposes, and is made visible by means of an oscillograph or the like, in particular with the aid of a cathode-ray oscillograph. This oscillograph is caused to indicate the decaying curve of the original aperiodic charge so that the reflected charge is manifested by its modifying effect on the decaying curve. The measurement of the time elapsed between the emission of the original surge and the receipt of its reflection, in consideration of the previously determined speed of propagation of the charge in the ground, is used as a measure for determining the depth of the reflecting stratum in a way similar to that used in the seismographic reflection method. A further improvement is obtained if the just-described reflection method is used in combination with a seismographic method. - V. S.

7249. Electromagnetic Device for Searching Sunken Ships, Iron-Containing Sands and Other Metal-Containing Bodies on the Sea Ground; Arnaldo Zabelli, Rome, Italy. Vested in the Alien Property Custodian. U. S. Application A.P.C. 410,612 published May 18, 1943.

This invention relates to an electromagnetic device for searching sunken ships, iron containing sands or other metal containing bodies on the sea bottom. The device consists essentially of a heavy waterproof case containing an electromagnet and an oscillatory circuit exciting the said electromagnet. By means of this device, the research is effected by measuring the impedance variations of the oscillatory circuit produced by the variations in the magnetic field of the electromagnet, due to the presence of metal-containing, especially of iron-containing, bodies. To compensate disturbing influences during the measuring, a Wheatstone bridge with additional variable resistance is inserted in the exciting circuit of the electromagnet. Provisions are made to allow before each measurement such a displacement of the galvanometer contacts on the sistances that the galvanometer is in the zero position. This regulation effected with the device drawn up over the point of measurement, for e purpose of eliminating the reactance variations due to magnetic sturbances which are frequent on the bottom of the sea. - V. S.

50- Oil Well Logging Method; C. R. Hocott, Houston, Tex., assignor to Standard Oil Development Co., Linden, N. J. Canadian Patent 413,399, issued June 22, 1943.

A method for logging wells drilled for oil which comprises collecting mples of the formations traversed at successive depths during the drill- g operation, measuring the oxidation reduction potential of each of said mples and correlating the values measured with sample depths. - aims allowed, 4.

51. Geophysical Exploration Apparatus; H. M. Evjen, Houston Tex., assignor to Nordel Corporation, Houston, Tex. Canadian Patent 415,209, issued September 14, 1943.

A system for electrical prospecting, comprising an earth-current rcuit including a source of direct current, a pair of spaced earth ectrodes, and reversing means connected between said source and said ectrodes for reversing the direct current at a predetermined controlled equency whereby an earth current having a predetermined frequency is ssed through the earth between said electrodes, a potential circuit cluding potential pick-up electrodes located at spaced points adjacent e earth's surface lying within the field of influence of said earth current, direct-current indicating device connected to indicate the potential of id potential circuit, and reversing means synchronized with said first versing means and connected between said potential pick-up electrodes d said indicating device to convert the picked-up potential difference to a unidirectional potential suited to actuate said indicating device, and upling means connected between said earth-current circuit and said tential which is directly proportional to the current flowing in said earth- rrent circuit at the instant of measurement, said coupling means com- ising a resistance connected in series with said earth-current circuit to velop a potential drop thereacross proportional to the current flowing in id earth-current circuit, a potentiometer connected in said potential rcuit to apply thereto a potential drop opposing the potential picked up om said potential pick-up electrodes, a condenser connected across said tentiometer, a second condenser, and synchronized switch means con- cted to alternately connect said second condenser across said resistance d across said first condenser, whereby said second condenser periodically receives a charge from the potential drop across said resistance and applies the same to said first condenser for thereby building up a charge in said first condenser which is proportional to the potential drop across said resistance. - Claims allowed, 7.

7252. Seismic Exploration Apparatus; J. P. Woods, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif. Canadian Patent 415,223, issued September 14, 1943.

For use in seismic exploration, a closed-path magnet structure comprising two members, one of said members being a magnet and the other an armature therefor, resilient means for supporting one of said members with regard to the other, one of said members being adapted to be laid loosely in contact with the ground to be subject to the vibrations thereof, and the other member being resiliently supported by said means to operate as an inertia element with respect to the vibratory member, one of said members having two legs and the other member being positioned by said resilient means to bridge said legs to form a variable nonmagnetic gap in the closed magnetic circuit comprising said members, whereby said magnetic structure is subjected to variation of magnetic flux upon vibration of the vibratory member. - Claims allowed, 10.

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